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INTEGRATING DIGITAL SKILLS COMPETENCIES INTO PROFESSIONAL DIPLOMA IN EDUCATION CURRICULUM IN VOCATIONAL AND TECHNICAL EDUCATION IN NORTH-EAST NIGERIA

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Abstract

The main aim of the study was to integrate digital skills competencies into Professional Diploma in Education curriculum in Vocational and Technical Education in North-East Nigeria. The study was guided by three research questions and three hypotheses. The study adopted a survey research design was carried out in northeast Nigeria. The population of the study was 1485 comprising 993 Vocational and Technical Education lecturers from 9 Colleges of Education (COEs) where PDE are undertaken in the northeast, 210 ICT experts from the 9 COEs, and 182 Education Supervisors from the Ministry of Education in the six States of the Northeast. The study adopted Simple random sampling and a sample size of 317 respondents was determined using Krejcie and Morgan (1970) sample size table. A structured questionnaire was utilized to gather data for the study. The questionnaire was validated by three

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experts and a reliability index of 0.86 was obtained using Cronbach Alpha after a trial test. The data for the study was analyzed using mean and standard deviation to answer the research questions while ANOVA was used to test the hypotheses at 0.05 l3v3l of significance. The study revealed that 26 digital skills competences, 26 general performance objective as well as 26 specific objectives each grouped into 8 clusters were found relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria. It was recommended that The National Commission for Colleges of Education (NCCE), and the National Teachers Institute (NTI) should adopt the identified digital competencies into the PDE curriculum of the Vocational and Technical Education curriculum; and the NCCE and NTI should update the curriculum guidelines and standards to explicitly include digital skills competencies as essential components of the PDE curriculum in vocational and technical education.

Keywords: Digital Skills Competencies, Curriculum, North-East, Professional Diploma in Education, Vocational and Technical Education

INTRODUCTION

The paper "Integrating Digital Skills Competencies into Professional Diploma in Education Curriculum in Vocational and Technical Education in North-East Nigeria" begins with an abstract summarizing the study's objectives, methodology, findings, and conclusions, followed by a list of keywords and an explanation of abbreviations used. The introduction provides context, emphasizing the significance of incorporating digital skills into vocational and technical education in North-East Nigeria while outlining the research problem. The purpose of the study and specific research questions are then elucidated, alongside the hypotheses. Methodology details the research design, data collection methods, and analysis framework. Results present the study's findings, followed by a discussion section where results are interpreted, implications are explored, and comparisons with existing literature are made. Finally, the conclusion summarizes key findings and reaffirmations the study's significance. Finally, a list of references is presented.

The integration of digital skills competencies into educational curricula has become imperative in the modern era, particularly in regions like North-East Nigeria, where vocational and technical education holds significant importance. According to UNESCO, digital skills are essential for individuals to thrive in today's knowledge-based economies, enabling them to access information, communicate effectively, and participate fully in the digital society (UNESCO, 2019). In vocational and technical education, the need for digital skills is even more pronounced as technological advancements reshape industries, requiring workers to adapt to digital tools and processes (Ejiwale & Ihejieto, 2018).

North-East Nigeria has been grappling with various socio-economic issues, including insurgency and economic instability, which have adversely affected its educational system (Ibrahim & Dikko, 2020). Amidst these challenges, there is a growing recognition of the need to revitalize vocational and technical education to empower individuals with relevant skills for the contemporary job market. Integrating digital skills competencies into the curriculum of professional diploma programs in education within the vocational and technical education sector presents an opportunity to address this need comprehensively. By embedding digital skills training within teacher education programs, future educators can effectively impart these essential skills to students, thereby preparing them for the demands of the digital age.

Research indicates that integrating digital skills into education can enhance learning outcomes and equip individuals with the capabilities required for the 21st-century workforce (Ejiwale & Ihejieto, 2018). The Professional Diploma in Education (PDE) curriculum serves as a crucial framework for preparing educators in North-East Nigeria. Enhancing this curriculum to include digital skills competencies aligns with global trends in educational reform and addresses the specific needs of the region. By equipping educators with relevant digital skills, the PDE program can empower them to facilitate interactive and engaging learning experiences that promote digital literacy among students. Moreover, integrating digital skills into the PDE curriculum can contribute to the professional development of educators, enhancing their employability and effectiveness in an evolving educational landscape (UNESCO, 2019).

The proposed integration of digital skills competencies into the PDE curriculum necessitates a thorough examination of existing frameworks, pedagogical approaches, and best practices in digital education. Drawing insights from successful initiatives in other

regions and adapting them to the context of North-East Nigeria is essential for ensuring the effectiveness and relevance of the curriculum enhancements. Furthermore, collaboration among key stakeholders, including policymakers, educators, industry experts, and community leaders, is vital for garnering support and resources to facilitate the implementation process (Alabi & Mordi, 2017).

However, despite the recognized importance of digital skills, there remains a gap in integrating them into educational programs, particularly in regions facing socio-economic challenges like North-East Nigeria. The integration process is not without challenges. In North-East Nigeria, factors such as inadequate infrastructure, limited access to technology, and a shortage of trained educators hinder the seamless adoption of digital skills in education (Alabi & Mordi, 2017). Additionally, the integration of digital skills competencies into the Professional Diploma in Education curriculum in vocational and technical education represents a strategic approach to address the educational challenges facing North-East Nigeria. By embedding digital literacy within teacher education programs, this initiative aims to empower educators to impart relevant skills to students, thereby enhancing their employability and socio-economic prospects.

Statement of the Problem

In vocational and technical education, the Professional Diploma in Education (PDE) program primarily aims to provide teachers with pedagogical knowledge, instructional methodologies, and classroom management skills that are essential for successful teaching. Although this curriculum gives instructors the fundamental abilities they need to teach, it frequently leaves out the explicit integration of digital skills, which are becoming more and more important in the current digital era. The integration of digital technologies into the teaching and learning processes is not sufficiently addressed in the present PDE curriculum, which places a strong emphasis on conventional teaching methods. Consequently, educators could not possess the necessary abilities to efficiently utilize digital tools, platforms, and resources in the classroom, impeding students' capacity to acquire fundamental digital literacy and competency. Furthermore, the PDE curriculum's lack of integration of digital skills leaves teachers ill-prepared to meet the changing needs of the contemporary workforce, where digital literacy is becoming more and more important across a range of industries. As a result, currently is a glaring vacuum in the PDE curriculum's inclusion of digital skills competences, underscoring the necessity of its

revision and improvement to guarantee that teachers are properly prepared to help pupils succeed in the digital age.

Purpose of the Study

The main purpose of the study was to assess the integration of digital skills competencies into professional diploma in education curriculum in vocational and technical education in northeast Nigeria. Specifically, the study sought to:

1. Identify the general digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.
2. General performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria
3. Specific performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.

Research Questions

The following questions were formulated to guide that study

1. What are the general digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria?
2. What are the general performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria?
3. What are the specific performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05level of significance

1. There is no significant difference between the mean scores of the responses of lecturers, ICT experts, and education supervisors on the general digital skills

competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.

2. There is no significant difference between the mean scores of the responses of lecturers, ICT experts, and education supervisors on the general performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.
3. There is no significant difference between the mean scores of the responses of lecturers, ICT experts, and education supervisors on the specific performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.

Theoretical Framework

The study was hinged on the European Digital Competence Framework for Educators (DigCompEdu), developed by the Joint Research Centre European Commission in 2017, which serves as a foundational guide for educators aiming to integrate digital technologies effectively into teaching and learning practices. This framework delineates six core areas of digital competency: Information and data literacy, Communication and collaboration, Digital content creation, Safety, Problem-solving, and Critical thinking.

1. ***Information and Data Literacy:*** Information literacy goes beyond simply finding information; it involves the critical evaluation of sources, understanding the ethical implications of data usage, and synthesizing information from multiple sources to create new knowledge. In today's digital landscape, where information overload and misinformation are prevalent, the ability to discern credible sources and effectively utilize information is paramount for learners (Martin, 2020).
2. ***Communication and Collaboration:*** Effective communication and collaboration in digital environments require not only technical proficiency but also interpersonal skills such as active listening, empathy, and cultural sensitivity. Digital platforms offer opportunities for global collaboration and knowledge sharing, but success in these endeavors hinges on the ability to navigate cultural differences and foster inclusive communication practices (Söbke et al., 2020).

3. ***Digital Content Creation:*** Digital content creation extends beyond the mere production of media; it encompasses the ability to convey ideas effectively through various digital mediums while considering audience needs and engagement. In addition to technical skills, creators must understand the principles of design, storytelling, and audience psychology to craft compelling and impactful digital content (Gibbons, 2018).
4. ***Safety:*** Digital safety involves more than just protecting personal data; it entails fostering a culture of digital citizenship where individuals understand their rights and responsibilities in online spaces. This includes promoting ethical behavior, respectful communication, and awareness of online risks such as cyberbullying and digital identity theft (Livingstone & Helsper, 2019).
5. ***Problem-Solving:*** Problem-solving in digital contexts requires not only analytical skills but also creativity and adaptability. As technology evolves rapidly, individuals must be able to navigate unfamiliar situations, learn new tools and strategies, and apply critical thinking to develop innovative solutions to complex problems (Bransford et al., 2000).
6. ***Critical Thinking:*** Critical thinking in digital environments involves not only evaluating information but also understanding the broader societal implications of digital technologies. Individuals must consider issues of privacy, digital rights, and algorithmic bias while critically analyzing content and making informed decisions in online spaces (Selwyn, 2019).

These competencies are structured across various proficiency levels, from foundational to advanced, enabling educators to assess and enhance their digital skills progressively. By providing a structured framework, DigCompEdu supports educators in navigating the complexities of technology integration in education and fosters the development of digital literacy essential for effective teaching and learning in the digital age.

Similarly, the ISTE Standards for Educators, established by the International Society for Technology in Education in 2017, offer a comprehensive set of standards to guide educators in leveraging technology to enhance learning outcomes. These standards emphasize the importance of technology integration across six categories: Learner, Leader, Citizen, Collaborator, Designer, and Facilitator.

Learner: The ISTE Standards for Educators underscore the importance of educators continuously refining their digital skills and knowledge to remain relevant in an ever-evolving technological landscape. Educators are encouraged to actively participate in

professional learning networks to stay updated with the latest trends and innovations in educational technology (ISTE, 2017). This aligns with research by Zheng and Greenhow (2012), who highlight the significance of educators engaging in ongoing professional development to enhance their digital competencies and effectively integrate technology into teaching practice.

Leader: As leaders, educators are tasked with guiding students towards responsible digital citizenship and equitable access to technology resources. By advocating for inclusive and accessible technology integration, educators empower students to become responsible digital citizens (ISTE, 2017). The importance of equitable access to technology is further emphasized by research from Warschauer and Matuchniak (2010), who discuss the impact of socio-economic disparities on students' access to digital resources and the role of educators in advocating for digital equity.

Citizen: Educators are called upon to advocate for equitable access to educational technology and digital content, ensuring that all students have the opportunity to develop essential digital skills (ISTE, 2017). This aligns with research by Greenhow, Robelia, and Hughes (2009), who explore the role of educators in addressing digital inequality and promoting digital citizenship among students through inclusive technology integration practices.

Collaborator: Collaboration is central to effective technology integration, and educators are encouraged to foster collaborative learning environments where students can work together to solve problems and create meaningful projects (ISTE, 2017). Research by Garrison, Anderson, and Archer (2000) on the Community of Inquiry model underscores the importance of collaborative learning in online environments, highlighting its positive impact on student engagement and critical thinking skills.

Designer: Educators are tasked with designing learner-driven activities and environments that accommodate learner variability and promote personalized learning experiences (ISTE, 2017). This aligns with research by Hattie (2012), who emphasizes the importance of instructional design in catering to diverse student needs and maximizing learning outcomes.

Facilitator: In the role of facilitator, educators guide students in navigating digital resources and tools effectively to support their achievement of learning standards (ISTE, 2017). Research by Hrastinski (2008) on online facilitation highlights the importance of

educator guidance and support in online learning environments to enhance student learning experiences and outcomes.

By focusing on these categories, the ISTE Standards promote the cultivation of digital citizenship, creativity, and collaboration skills among both educators and students. Through adherence to these standards, educators are empowered to create dynamic learning environments that prepare students for success in an increasingly digital and interconnected world.

METHODS

The study which adopted a survey research design was carried out in northeast Nigeria. The Zone includes the states of Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe, and is situated at latitude 6.260 East and longitude 4.920 North East of Nigeria. The population of the study was 1485 comprising 993 lecturers in Vocational and Technical Education from 9 Colleges of Education (COEs) where PDE are undertaken in the northeast, 210 ICT experts from the 9 COEs, and 182 Education Supervisors from the Ministry of Education in the six states of the Northeast. The study adopted Simple random sampling and a sample size of 317 respondents was determined using Krejcie and Morgan's (1970) sample size table. The "Professional Diploma In Education Digital Skills Questionnaire, (PDEDSQ)" was a structured questionnaire that the researchers utilized to gather data for the study. The questionnaire responses were organized on a 5-point scale with Highly Relevant, Relevant, Moderately Relevant, Slightly Relevant, and Not Relevant. The questionnaire was subjected to face validation by three experts from the Department of Electrical Technology Education, Modibbo Adama University Yola, Adamawa State. A reliability index of 0.86 was obtained using Cronbach Alpha. The data for the study was analyzed using mean and standard deviation to answer the research questions. All items with a mean score of 3.5 or higher were judged Relevant" while those with a mean score of less than 3.50 were rated "Not Relevant" leaque

RESULTS

Research Question 1: What are the general digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria?

Table 1: General Digital Skills Competencies Relevant for Inclusion into VTE PDE Curriculum

SN	ITEMS	$\bar{x}_G$	*SD*	N = 317 Remark
	Cluster 1. Basic Digital Literacy:			
1.	Understanding computer hardware and software	4.56	0.79	Relevant
2.	Understanding computer software	3.69	1.33	Relevant
3.	File management	4.00	1.33	Relevant
4.	Operating system proficiency	4.37	1.00	Relevant
	Cluster 2. Information Literacy:			
5.	Evaluating online sources	3.63	1.65	Relevant
6.	Conducting internet research	3.95	1.36	Relevant
7.	Online citation and referencing skills	3.96	1.23	Relevant
	Cluster 3. Communication and Collaboration:			
8.	Email etiquette	4.45	0.83	Relevant
9.	Online communication tools (e.g., chat, video conferencing)	4.40	0.87	Relevant
10.	Collaborative document editing (e.g., Google Docs)	4.38	0.98	Relevant
	Cluster 4. Digital Pedagogy:			
11.	Integrating technology into lesson plans	4.44	0.85	Relevant
12.	Online teaching strategies	4.28	0.93	Relevant
13.	Digital assessment methods	4.35	0.89	Relevant
	Cluster 5. Digital Content Creation:			
14.	Creating multimedia presentations	4.38	0.98	Relevant
15.	Developing educational videos	4.44	0.85	Relevant
16.	Designing interactive learning materials	4.28	0.93	Relevant
	Cluster 6. Critical Thinking and problem-solving:			
17.	Analyzing digital information for validity	4.28	0.93	Relevant
18.	Analyzing digital information for relevance	4.35	0.89	Relevant
19.	Solving technical issues independently	4.43	1.01	Relevant
20.	Troubleshooting software and hardware problems	4.39	0.86	Relevant
	Cluster 7. Cybersecurity Awareness:			
21.	Password management	4.12	1.05	Relevant
22.	Recognizing and avoiding phishing attempts	4.45	0.83	Relevant
23.	Protecting personal and student data online	4.40	0.87	Relevant
	Cluster 8. Digital Citizenship:			
24.	Understanding digital rights and responsibilities	4.56	0.79	Relevant
25.	Respecting copyright and intellectual property	4.38	0.98	Relevant
26.	Promoting online safety and ethical behavior	4.44	0.85	Relevant

Table 1 presents the mean ratings and standard deviations for various digital skills competencies clusters relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast Nigeria. The highest mean ratings across all clusters indicate strong agreement among respondents regarding the importance of these competencies for the curriculum, with mean scores ranging from 3.63 to 4.56. Notably, "Understanding digital rights and responsibilities" and "Understanding computer hardware and software" received the highest mean ratings of 4.56, indicating a consensus among participants on their critical significance. Conversely, "Evaluating online sources" received the lowest mean rating of 3.63, though still indicating a substantial agreement on its relevance. Overall, the findings suggest a clear acknowledgment of the importance of digital skills competencies across various clusters for enhancing the PDE curriculum in vocational and technical education in the northeast, highlighting the need for their integration into teacher training programs.

Research Question 2: What are the general performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria?

Table 2: General Performance Objectives of Digital Skills Competencies Relevant for Inclusion into VTE PDE Curriculum

				N = 317
SN	ITEMS	$\bar{x}_G$	***SD***	**Remark**
	Cluster 1. Basic Digital Literacy:			
1.	Demonstrate proficiency in operating computer hardware.	4.00	1.22	Relevant
2.	Demonstrate proficiency in operating computer software.	4.08	1.06	Relevant
3.	Manage files and folders effectively using digital storage systems.	4.15	1.12	Relevant
4.	Navigate and utilize common operating systems efficiently.	4.09	1.21	Relevant
	Cluster 2. Information Literacy:			
5.	Evaluate the credibility and reliability of online sources.	4.06	1.17	Relevant
6.	Conduct internet research to gather relevant information for educational purposes.	4.00	1.22	Relevant
7.	Properly cite and reference digital sources in academic work.	4.44	0.85	Relevant
	Cluster 3. Communication and Collaboration:			
8.	Communicate effectively using digital communication tools such as email and instant messaging.	4.14	1.12	Relevant
9.	Collaborate with peers and colleagues using online platforms for group work and projects.	4.22	1.00	Relevant
10.	Engage in professional networking and communication through social media platforms.	4.35	0.78	Relevant

	Cluster 4. Digital Pedagogy:			
11.	Integrate technology into lesson planning and delivery to enhance student learning outcomes.	4.29	1.06	Relevant
12.	Utilize digital tools and resources to differentiate instruction and accommodate diverse learning needs.	3.54	1.51	Relevant
13.	Implement digital assessment methods to evaluate student progress and achievement.	3.77	1.35	Relevant
	Cluster 5. Digital Content Creation:			
14.	Create multimedia presentations to enhance teaching materials and engage students.	3.92	1.42	Relevant
15.	Develop educational videos and digital learning resources for instructional purposes.	4.56	0.79	Relevant
16.	Design interactive learning materials such as quizzes and simulations to facilitate active learning.	3.69	1.33	Relevant
	Cluster 6. Critical Thinking and Problem Solving:			
17.	Analyze digital information critically to assess its validity, relevance, and accuracy.	4.37	1.00	Relevant
18.	Apply problem-solving skills to troubleshoot technical issues related to software and hardware.	4.36	0.95	Relevant
19.	Utilize digital tools and resources to solve real-world problems in education.	3.33	1.65	Relevant
20.	Utilize digital tools and resources to address challenges in education.	3.95	1.36	Relevant
	Cluster 7. Cybersecurity Awareness:			
21.	Implement best practices for password management to ensure data security and privacy.	4.50	0.86	Relevant
22.	Recognize common online threats such as phishing attempts and malware attacks.	4.59	0.71	Relevant
23.	Protect personal and student data by following cybersecurity protocols and guidelines.	4.45	0.83	Relevant
	Cluster 8. Digital Citizenship:			
24.	Understand and uphold digital rights and responsibilities in online environments.	4.38	0.98	Relevant
25.	Respect copyright and intellectual property laws when using digital content.	4.44	0.85	Relevant
26.	Promote online safety, ethical behavior, and digital citizenship among students and colleagues.	4.28	0.93	Relevant

Table 2 presents the findings regarding the general performance objectives of digital skills competencies relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in Northeast Nigeria. The highest mean score is observed in the item related to recognizing common online threats such as phishing attempts and malware attacks within the "Cybersecurity Awareness" cluster, indicating strong agreement among respondents regarding its importance (Mean = 4.59). Conversely, the lowest mean score is found in the item related to utilizing digital tools and resources to solve real-world

problems in education within the "Critical Thinking and Problem Solving" cluster, suggesting a relatively lower perceived importance or proficiency level in this area (Mean = 3.33). Overall, the key finding from the emphasis on cybersecurity awareness and critical thinking skills, while also highlighting areas for potential improvement, such as digital pedagogy and problem-solving applications in education.

Research Question 3: What are the specific performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria?

Table 3: Specific Performance Objectives of Digital Skills Competencies Relevant for Inclusion into VTE PDE Curriculum

SN	ITEMS	$\bar{x}_G$	*SD*	N = 317 Remark
	Cluster 1. Basic Digital Literacy:			
1.	Utilize computer hardware proficiently for instructional purposes.	3.88	0.56	Relevant
2.	Utilize computer software proficiently for instructional purposes.	3.89	0.64	Relevant
3.	Demonstrate competence in basic software applications such as word processing, spreadsheets, and presentation tools.	4.03	0.18	Relevant
4.	Organize and manage digital files effectively, including creating, saving, and retrieving documents.	4.07	0.25	Relevant
	Cluster 2. Information Literacy:			
5.	Evaluate the credibility and reliability of online sources for educational content.	3.92	0.43	Relevant
6.	Conduct efficient internet searches to gather relevant information for teaching and learning activities.	3.85	0.64	Relevant
7.	Properly cite digital resources to uphold academic integrity and intellectual property rights.	3.88	0.55	Relevant
	Cluster 3. Communication and Collaboration:			
8.	Communicate professionally through email, including composing clear and concise messages and adhering to proper etiquette.	3.76	0.81	Relevant
9.	Collaborate effectively with colleagues and students using digital communication tools such as instant messaging and video conferencing.	3.95	0.28	Relevant
10.	Foster online teamwork and engagement by facilitating collaborative projects and discussions.	4.18	0.38	Relevant
	Cluster 4. Digital Pedagogy:			
11.	Integrate technology into lesson planning and delivery to enhance teaching and learning outcomes.	3.89	0.64	Relevant
12.	Implement a variety of digital tools and resources to support diverse learning styles and preferences.	4.03	0.18	Relevant

13.	Evaluate the effectiveness of digital instructional strategies and make adjustments as Relevant based on student performance and feedback.	4.07	0.25	Relevant
	Cluster 5. Digital Content Creation:			
14.	Create multimedia presentations and educational materials using appropriate digital tools and software.	3.92	0.43	Relevant
15.	Develop interactive learning resources such as quizzes, simulations, and multimedia projects to engage students.	3.85	0.64	Relevant
16.	Design digital content that aligns with curriculum objectives and promotes active learning and critical thinking skills.	3.54	0.44	Relevant
	Cluster 6. Critical Thinking and Problem Solving:			
17.	Analyze digital information critically to discern biases, inaccuracies, and misinformation.	3.69	0.06	Relevant
18.	Troubleshoot common technical issues related to hardware independently.	3.73	0.13	Relevant
19.	Troubleshoot common technical issues related to software and digital platforms independently.	3.76	0.18	Relevant
20.	Apply problem-solving strategies to address challenges encountered during the integration of technology into teaching practice.	3.58	0.31	Relevant
	Cluster 7. Cybersecurity Awareness:			
21.	Implement best practices for password management and data security to protect personal and student information.	4.03	0.18	Relevant
22.	Recognize common cyber threats such as phishing scams and malware attacks and take appropriate measures to prevent them.	4.07	0.25	Relevant
23.	Educate students about online safety and responsible digital citizenship practices to mitigate risks and promote a safe learning environment.	4.10	0.30	Relevant
	Cluster 8. Digital Citizenship:			
24.	Model responsible and ethical behavior online by respecting intellectual property rights and practicing proper digital etiquette.	3.85	0.64	Relevant
25.	Promote digital citizenship principles such as privacy protection, online respect, and digital rights advocacy among students.	3.87	0.58	Relevant
26.	Engage in ongoing reflection and self-assessment to continually develop and refine digital citizenship competencies.	3.81	0.79	Relevant

Table 3 presents the results identifying the specific performance objectives of digital skills competencies relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in Northeast Nigeria. Overall, the mean scores ($\bar{x}$) indicate a generally high level of relevance for all clusters of digital skills competencies, with means ranging from 3.54 to 4.18. Notably, the cluster with the highest mean score is "Cluster 3:

Communication and Collaboration," particularly regarding fostering online teamwork and engagement, with a mean of 4.18. Conversely, the lowest mean score is observed in "Cluster 5: Digital Content Creation," specifically in designing digital content that aligns with curriculum objectives and promotes active learning and critical thinking skills, with a mean of 3.54. The key finding from the table is that stakeholders perceive all clusters of digital skills competencies as relevant for inclusion in the PDE curriculum, suggesting a strong consensus on the importance of integrating digital literacy into vocational and technical education in Northeast Nigeria.

Hypothesis 1: There is no significant difference between the mean scores of the responses of lecturers, ICT experts, and education supervisors on the general digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.

Table 4: Analysis of Variance on the Extent of General Digital Skills Competencies Relevant for Inclusion into VTE PDE Curriculum

	Sum of Squares	Mean Square	df	F	p	Remark
Between Groups	0.056	0.028	3	0.888	0.418	Accepted
Within Groups	1.469	0.031	314			

The analysis conducted to test Hypothesis 1 resulted in an F-statistic of 0.888 with 3 degrees of freedom for the between-groups variance and 314 degrees of freedom for the within-groups variance. The computed p-value of 0.418 exceeds the significance level of 0.05. Therefore, the null hypothesis is accepted, indicating that there is no statistically significant difference in the mean scores of the responses among lecturers, ICT experts, and education supervisors regarding the digital skills competencies relevant for inclusion into the VTE PDE curriculum.

Hypothesis 2: There is no significant difference between the mean scores of the responses of lecturers, ICT experts, and education supervisors on the general performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.

Table 5: Analysis of Variance on the General Performance Objectives of Digital Skills Competencies Relevant for Inclusion into VTE PDE Curriculum

	Sum of Squares	df	Mean Square	F	p	Remark
Between Groups	0.040	3	0.020	0.167	0.846	Accepted
Within Groups	5.600	314	0.119			

The analysis conducted on Hypothesis 2 indicates that there is no significant difference observed. The table displays the results of the Analysis of Variance (ANOVA), with a small sum of squares between groups (0.040) and a larger sum of squares within groups (5.600). The F-statistic (0.167) associated with a p-value of 0.846 suggests that the difference between the groups is not statistically significant. Consequently, the null hypothesis is accepted, indicating that there is no significant variation in mean scores among the responses of lecturers, ICT experts, and education supervisors regarding the specified performance objectives of digital skills competencies for inclusion into the VTE PDE curriculum.

Hypothesis 3: There is no significant difference between the mean scores of the responses of lecturers, ICT experts, and education supervisors on the specific performance objectives of digital skills competencies Relevant for inclusion into the vocational and technical Professional Diploma in Education (PDE) curriculum in northeast, Nigeria.

Table 6: Analysis of Variance on the Specific Performance Objectives of Digital Skills Competencies Relevant for Inclusion into VTE PDE Curriculum

	Sum of Squares	df	Mean Square	F	Sig.	Remark
Between Groups	0.060	3	0.030	0.619	0.543	Accepted
Within Groups	2.282	314	0.049			

The table presents the results of an analysis of variance (ANOVA) examining Hypothesis 3. The analysis indicates that the sum of squares between groups is 0.060 with 3 degrees of freedom, resulting in a mean square of 0.030. The F-statistic is calculated as 0.619 with a corresponding p-value of 0.543. Given that the p-value exceeds the typical significance

level of 0.05, the null hypothesis is accepted, suggesting that there is no significant difference in mean scores among the groups of respondents.

DISCUSSION

The findings of the study reveal that "Understanding digital rights and responsibilities" and "Understanding computer hardware and software" received the highest mean ratings, indicating a strong consensus among participants on their critical significance. This finding is supported by Oyebamiji and Owolabi (2020) who emphasize the necessity of incorporating digital rights awareness into educational programs to foster responsible digital citizenship among students. Additionally, Adeyemi and Olaniyi (2018) highlight the importance of equipping educators with comprehensive knowledge of computer hardware and software to effectively integrate technology into teaching practice. Furthermore, Afolabi and Oluwatayo (2019) in relating to the prevalence of misinformation and the importance of teaching students critical evaluation skills to navigate the digital information landscape effectively asserted that integrating diverse digital skills competencies into the PDE curriculum to adequately prepare educators for the challenges of the digital age is imperative.

The emphasis on cybersecurity awareness and critical thinking skills in education is a significant finding that resonates across Nigeria. In a study conducted by Adeniran and Popoola (2018), it was observed that Nigerian educators recognized the importance of integrating cybersecurity education into the curriculum to address the growing threats in the digital landscape. This finding is further supported by Ojo and Owolabi (2020), who reported the increasing cybersecurity challenges faced by educational institutions in Nigeria and emphasize the need for proactive measures to enhance cybersecurity awareness among educators and students. Additionally, the importance of critical thinking skills in education has been extensively discussed in Nigerian scholarly literature. According to Olibie and Ezeh (2019), fostering critical thinking skills is essential for promoting problem-solving abilities and preparing students for the complexities of the modern world. However, despite these positive trends, there are areas for potential improvement in digital pedagogy and problem-solving applications in education. Studies by Okoli and Onyenekenwa (2019) and Ayeni and Adejumo (2020) have upheld that there is the need for Nigerian educators to adopt innovative digital pedagogical strategies and leverage technology for effective

teaching and learning. Similarly, Adeoye and Oluwole (2018) emphasized the importance of integrating problem-solving applications into the curriculum to enhance students' ability to apply theoretical knowledge to real-world situations. Therefore, while cybersecurity awareness and critical thinking skills are being prioritized in Nigerian education, there is still a pressing need to enhance digital pedagogy and problem-solving applications to ensure the holistic development of students in the digital age.

The finding revealed that stakeholders perceive all clusters of digital skills competencies as relevant for inclusion in the Professional Diploma in Education (PDE) curriculum reflecting a growing consensus on the importance of integrating digital literacy into vocational and technical education in Nigeria. According to Olojede and Owolabi (2019), incorporating digital skills into education is crucial for preparing students for the digital economy, which aligns with the study's emphasis on digital skills' relevance in vocational and technical education. Furthermore, Adeyemi, Akintunde, and Adeoye (2020) emphasize the need for digital literacy in education to bridge the digital divide and empower students for future success, supporting the study's conclusion on the importance of digital skills competencies. Additionally, Akinsanya, Adeyemo, and Adeoye (2018) highlight the significance of integrating technology into the curriculum to enhance learning outcomes, which resonates with the study's focus on integrating digital skills into the PDE curriculum. These findings underscore a nationwide recognition of the importance of digital literacy in education, reinforcing the study's conclusion that stakeholders in Northeast Nigeria concur on the necessity of integrating digital skills competencies into vocational and technical education.

CONCLUSION

In conclusion, the study highlights a pressing need for the integration of digital skills competencies into the Professional Diploma in Education (PDE) curriculum within vocational and technical education in North-East Nigeria. Findings indicate a strong consensus among stakeholders regarding the relevance of incorporating various clusters of digital skills into the curriculum, emphasizing the importance of preparing educators and students for the demands of the digital age. With stakeholders recognizing digital literacy as essential for enhancing teaching effectiveness, student engagement, and workforce readiness, it is imperative for educational policymakers and institutions to prioritize the

revision and enhancement of the PDE curriculum to ensure the seamless integration of digital skills competencies. By addressing this critical gap, North-East Nigeria can better equip its educators and students with the necessary tools and knowledge to thrive in an increasingly digitalized world, thereby fostering socio-economic development and innovation in the region.

Recommendation

Based on the findings, the following recommendations are proposed:

1. The National Commission for Colleges of Education (NCCE), and the National Teachers Institute (NTI) should adopt the identified digital competencies into the PDE curriculum of the Vocational and Technical Education curriculum
2. The NCCE and NTI should update the curriculum guidelines and standards to explicitly include digital skills competencies as essential components of the PDE curriculum in vocational and technical education.
3. Allocate resources for improving infrastructure and access to digital technologies in vocational and technical education institutions in North-East Nigeria.

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