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TECHNOLOGY ENHANCED LEARNING TOOLS USAGE AND INSTITUTIONAL POLICY FRAMEWORKS AMONG TVET TEACHERS: THE MODERATING ROLE OF WORK EXPERIENCE

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Abstract

The study investigated the role of work experience on institutional policy framework, access and utilization of Technology Enhanced Learning (TEL) tools among TVET teachers in Nigerian tertiary institutions. Two research questions and two null hypotheses guided the study. The sample for the study was 318 teachers from six tertiary institutions that offer Vocational and Technical Education programmes in Nigeria. Instrument for data collection was developed by the researchers and was validated by five experts in Vocational and Technical Education. The overall reliability index of the instrument was 0.81. Results from collected data revealed that many institutional policy frameworks run in TVET institutions do not promote technology enhanced learning; there is a positive relationship between access to TEL resources and years of experience; gender does not play a significant role in the use and access to TEL tools. It is recommended that TVET institutions should draw up policies that encourage TEL use; and engage teachers with TEL as they advance in their professional experiences, irrespective of gender.

Keywords: Technology-enhanced Learning, TVET, Years of Experiences, Institutional Policy Framework, Gender.

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Introduction

Technical Vocational Education and Training (TVET) institutions are faced with the challenge of upgrading the skill sets of their teachers/instructors to suit the technologically evolving instruction delivery process of the current times because of the constant disruptions on the educational system. As reported by ILO (2021), vocational training and apprenticeship programmes were very much disrupted by the COVID-19 pandemic. According to a global survey of more than 1,350 providers of Technical Vocational Educational Training (TVET) otherwise known as Vocational and Technical Education, in many countries and training providers were insufficiently prepared to respond to the constraints that resulted from the crisis. Other emergency situations, including insurgency, flooding, landslide, tribal wars among others, have equally disrupted teaching-learning of TVET.

TVET is an education designed to develop skills, abilities, understanding, attitudes, work habits and appreciations encompassing knowledge and information needed to enter and progress in employment on a useful and productive basis (Nwankwo, 2024). According to UNESCO (2023), TVET comprises education, training and skills development relating to a wide range of occupational fields, production services and livelihoods. It empowers individuals, organizations, enterprises and communities and fosters employment, decent work and lifelong learning thereby promoting inclusive and sustainable economic growth and competitiveness, social equity and environmental sustainability. This assertion suggests that TVET is an important tool for government to decrease unemployment, to provide workforce to private sector, and to attract foreign direct investment, as the economic prosperity of a country is based on the education and technical expertise of its population (TVET Journal, 2021).

Consequently, the need to strengthen instruction delivery of TVET against the regular disruptions arose and many schools opted for distance learning through Technology Enhanced Learning (TEL). TEL is the implementation of technology into teaching

methods to enhance the learning process. According to Trentin (2009), TEL is the use of ICT to maximize learning within an environment of sound design that can offer students the options of time, place and pace, emphasizing different learning styles. TEL describes both analog and digital technologies that enhances the learning experience. However, more recently, digital TEL is taking over education in the form of different tools including educational software, devices and platforms (Cullen, 2021; Sen, & Leong, 2020). These TEL tools are necessary in overcoming situations that tend to abruptly terminate the classroom and school sessions. However, regarding the use of the tools in TVET delivery in times of emergencies, the scenario in many African schools is that many teachers that teach TVET subjects are yet to acclimatize to the use of TEL tools, majorly due to low level of skilling (Naidoo & Dawuwa, 2019, Igwe & Ayandokun, 2023).

Furthermore, in order to meet the TVET needs of the teaming population of societies, TVET is run in many ways in form of institutions. Technical Vocational Education and Training (TVET) Institutions are usually formal or non-formal educational settings that provide competency-based training focusing on technical and practical skills in order to meet labor market demand. As asserted by UNESCO (2015), TVET as a long-life learning, can take place at secondary, post-secondary, and tertiary levels, including work-based learning and continuing training/professional development which may lead to qualifications. Obtaining qualifications form TVET institutions are usually guided by institutional policies and frameworks. An institutional policy is a plan or course of action developed by an institution to guide actions (Schifter, 2009). Similarly, Institutional Policies are courses or methods of action selected usually by an organization institution, university, or society, among alternative to guide and determine present and future decisions and positions on public matters (Dataseller, 2010). In the same vein, TVET institutions that run technology enhanced learning should run policies that provide the basis for all activities associated with TEL instructions delivery and training. This policy should be able to give adequate and

feasible direction on access and utilization of technology enabled teaching and learning. An institutional policy framework should be able to determine various important processes that need to be followed for obtaining relevant decisions, authorizations and approvals from relevant local authorities (Peters, 2019; Achieng & Kaunda-Arara, 2022).

In addition to the essence of effective institutional policy frameworks for a technology enabled learning environment, is the issue of experience gained over time by the institution running TEL. Staffing Advisors (2011), asserts that extensive research proves that, statistically, work experience is one of the best predictors of future performance. Nevertheless, in the opinion of Adams (2018), work experience alone without proof of measurable accomplishment is not enough in today's age of continuous improvement. This study therefore, investigated the role of work experience in institutional framework for access and use of TEL tools by teachers in TVET institutions.

Theoretical Framework

The Replacement, Amplification, and Transformation (RAT) model developed by Hughes (1998) supports this study. The model identified three broad areas of technology application to include instructional method, student learning processes and curriculum goals. The RAT model explained that technology is functioning as replacement, amplification, or transformation in educational practice. As Replacement, technology replaces established instructional practices, student learning processes, or content goals, and serves as a means to the same instructional end without in any way changing them. This is so because technology serves in replicating an already functioning instructional method, learning process, or content goal in the classroom, but changes the medium used to achieve a well-established purpose. Technology as Amplification is used to amplify current pedagogical practices, student learning, or content goals with a view to increasing efficiency and productivity. The aim of

technology as amplification is for effectiveness or streamlining rather than change. As transformation, technology emphasizes the transformation of the instructional practices, the students' learning processes, and the actual subject matter. The theory is relevant to the present study because it emphasizes the importance of replacing old pedagogies, increasing the use of new technologies, and transforming new technologies in line with the needs of the industries and emerging societies.

Literature Review

The world has witnessed several disease outbreaks, epidemics and pandemics caused by more than 20 infectious agents over the past decades, each producing negative impacts on man, including education (WHO, 2020). For instance, the 2019–20 corona virus pandemic alone affected the education sector globally, resulting in near-total closure of learning institutions globally. As at April 2020, UNESCO reported that approximately 1.723 billion learners have been cut off from education due to school closures as a means to contain the spread of the pandemic, with about 191 countries implementing nationwide closures (UNESCO 2020). The lockdown of economic activities and other sectors including the education sector often produce negative impacts and limits learning facilities, limits education opportunities, prolong study, and learning disruption among others. Hallgarten (2020) identified the effects of school closures including reduction in access to education services, among others.

Access to quality education is critical to sustained improvements in productivity, the reduction of inter-generational cycles of poverty, reductions in inequality and overall improvement in the standard of living of the people (Lewin, 2007). Access to Vocational and Technical Education means the opportunity provided for people not only to enroll or register for the programme, but also to access quality instruction at all times, places, and circumstances. Access to quality education is generally limited during emergency situations because of restrictions imposed as a means of protecting the people and promotes safety of lives and properties (CALS, 2009), thus separating

people from learning environment. To ensure that shutdown of schools do not result in disrupted learning, innovative pedagogies and technologies are developed to ensure that skill acquisition and training continues while at home. Hence, Daniela (2019) highlights the need to transform the learning process beyond the time and space frame to support future generations in developing the competences they need to live and work in a technology-rich environment.

One pedagogical approach that fits this narrative and has the capability to promote effective teaching and learning, as well as guarantee undisrupted learning outside of the confined classroom environment is Technology-Enhanced Learning (TEL). TEL is a combination of all approaches in which technology is used to support the learning or teaching process (Ulmane-Ozolina, et. al., 2019; Chen, 2019). Huang, et al. (2020), asserts that TEL draws on technology to maximize learning within an environment of high-quality course design that can offer students the options of time, place, and pace, and emphasizes different learning styles. As opined by Daniela (2019), technology-enhanced learning (TEL) has become a topical issue in today's education sector, where technology and digital solutions can be used for a variety of purposes to transform the learning environment.

The benefits of TEL are enormous as it has the potentials to break the limitations posed on the learner's educational opportunities as a result of his confinement within the walls of a school system, and his home during emergency periods. According to Hutchinson (2016), the adoption of TEL has been on the increase in the recent past due to its flexibility, cost-effectiveness, and relevancy. TEL facilitates personalize training, and provide autonomy to learners and ensures that disruption in classrooms do not disrupt learning, particularly in periods of emergencies and pandemic which result in lock down of social, economic and academic activities. However, the use of TEL tools in teaching and learning is not without obvious challenges. Thomas, et al. (2017); and Yeap, et al. (2016) identified challenges of using TEL to include the cost, both at the individual and institutional levels, which can discriminate against users from low-

income backgrounds, and the chances of obsolescence of devices used due to rapid technological revolution.

Effective education impacts positively on the growth of the individual because it enables a better life and experiences, hence enabling greater chances of securing highly paid jobs. For the society, good quality education yields the ideal citizens who will keep the society peaceful by promoting the ideals and values for which the society stand for. Graduates who acquire quality skills and education from their respective institutions are most likely to be employable. With teachers skilled in the utilization of TEL in the delivery system of vocational and technical education, the incessant breaches and disruption of training programmes during cases of emergency are contained, and instructions tailored to the specific needs of individual learners. This will promote the quality of acquired skills and their relevance to the workplace.

Specific objectives

Specifically, the study investigated the following:

1. Institutional policies that promote the use of technology-enhanced learning tools?
2. Relationship between Work experience and access to TEL resources among VTE teachers?

Research questions

1. What institutional policies promote the use of technology-enhanced learning tools?
2. What is the relationship between work experience and access to TEL resources among VTE teachers?

Hypotheses

1. Work experience of TVET teachers will moderate the relationship between their access to TEL resources and their TEL tools experience

2. Gender of VTE teachers moderates the relationship between their access to TEL resources and TEL tools experience.

Methods and Materials

The study adopted a descriptive survey research design. The study was carried out in tertiary institutions that offer Degree programmes in Vocational and Technical Education in Nigeria. Six institutions that offer Vocational and Technical Education programmes were purposively selected for the study. They are Abubakar Tafawa Balewa University (ATBU) Bauchi, Benue State University (BSU) Markurdi, Kaduna Polytechnic (KADPOLY), University of Nigeria, Nsukka (UNN), University of Uyo (UNIUYO), and Yaba College of Technology (YABATECH), Yaba, Lagos. A total of 318 VTE teachers responded to the developed instrument for data collection. 49.1% of the respondents specialize in Industrial Technical Education, 20.8% specialize in Business Education, 13.2% Computer Education, 9.4% Home Economics Education, and 7.5% Agricultural Education. 66% of the respondents are males, while 34% are females. The instrument for data collection was developed by the researchers after extensive literature review. The instrument consists of two sections. Section A contains background information of the respondents. Section B has two parts: Part I – containing information about institutional policies that promote Technology Enhance Learning (TEL) (5 items), and Part II which contains items that elicited the relationship between years of experience and access to TEL resources by TVET teachers (6 items).

The items on institutional policies that promote Technology Enhanced Learning (TEL) had two response options of: Yes and No; while items on the relationship between years of experience and access to TEL resources by TVET teachers had response options of Strongly Agree(SA), Agree (S), Disagree (D), Strongly Disagree(SD). The results obtained from the options on Part I were interpreted using Percentage; a score of 50% in any of the response options determined if the policy supports TEL or not. The results from Part II were interpreted using Pearson product-moment correlation thus: r = 1 -

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Perfect positive linear correlation; 1>r≥0.8 - Strong positive linear correlation; 0.8>r≥0.4 - Moderate positive linear correlation, 0.4>r>0 - Weak positive linear correlation; r=0 – No Correlation; 0>r≥−0.4 - Weak negative linear correlation; −0.4>r≥−0.8 - Moderate negative linear correlation; −0.8>r>−1 - Strong negative linear correlation; and r=−1 - Perfect negative linear correlation.

The instrument was validated by 5 experts in Vocational and Technical Education at the University of Nigeria, Nsukka. To determine the reliability of the instrument, the instrument was administered to 15 VTE teachers at Nnamdi Azikiwe University Awka and a reliability coefficient value of 0.81 was obtained for the entire instrument, 0.83 for items on institutional policies that promote Technology Enhance Learning (TEL); and 0.82 for items on relationship between years of experience and access to TEL resources by TVET teachers. The instrument was administered using Google Form. It took two weeks to completely receive responses from the respondents through the form.

Percentage was used to analyze data from research questions one and the demographic information. The hypotheses were tested using t-test for independent sample and regression analysis for hypothesis 1 and 2 respectively.

Results

Table 1: Frequency responses of VTE lecturers on institutional policies that promote the use of technology-enhanced learning tools

N = 318

S/n	Institutional policies which link strategy with the implementation of TEL tools	Yes		No		Decision
		N	%	N	%	
1	Learning, Teaching, and Assessment policy	228	71.70	90	28.3	Yes
2	Virtual Learning Environment (VLE) usage policy (minimum requirements)	78	24.50	240	75.50	No
3	Faculty TEL policy	36	11.30	282	88.70	No
4	Guidelines for virtual learning environment services	24	7.50	294	92.50	No
5	Electronic Management of Assessment (e-Assessment/e- Submission) policy	102	32.10	216	67.90	No

Data in Table 1 showed that Learning, Teaching, and Assessment policy with a score of 71.70% under the yes category, promotes the use of Technology Enhanced Learning tools. Items 2 -5 with scores of 75.50%, 88.70%, 92.50% and 67.90% respectively in the No category do not promote the use of TEL.

Table 2: Correlation between work experience and access to TEL resources among VTE teachers

	Year of experience	Computer	Printers	Multimedia Projector	High Speed Internet	Distance Learning Platform	Interactive White board
Work experience	1						
Computer	-.190**	1					
Printers	-.086	.643**	1				
Multimedia Projector	.012	.428**	.518**	1			
High Speed Internet	-.144*	.363**	.428**	.522**	1		

Distance Learning Platform	-.082	.369**	.288**	.441**	.484**	1	
Interactive White board	-.060	.382**	.350**	.448**	.251**	.421**	1

Data in Table 2 showed a moderate positive correlation between years of experience and access to printers, high speed internet, distance learning and interactive White board with correlation coefficients of (0.643, 0.518, 0.522, 0.484, and 0.421); and a strong negative correlation between work experience and access to computers (r = -0.190).

Hypothesis 1: Work experience of VTE teachers will significantly moderate the relationship between their access to TEL resources and their TEL tools experience

Table 3: Moderating effect of Work experience VTE teachers on their access to TEL tools and their TEL tools experience

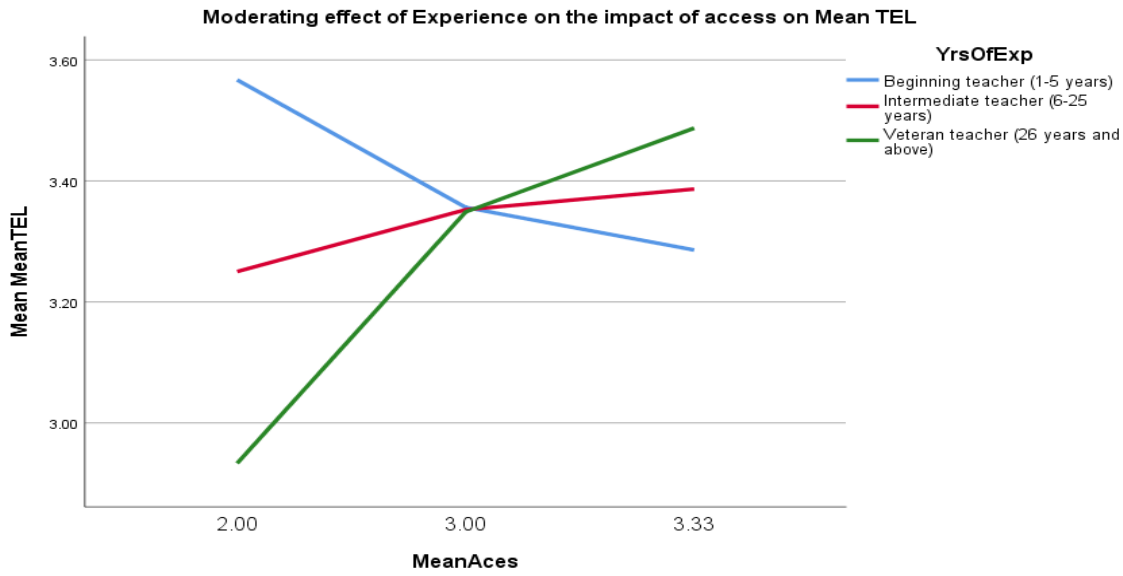
Moderators									
Work experience					Gender				
Predictors	B	**t**	**LLCI**	**ULCI**	**predictors**	**B**	**T**	**LLCI**	**ULCI**
TEL access	-0.524	-5.23	-0.721	-0.327	**TEL access**	0.031	0.2620	-0.201	0.263
Yrs_of_exp.	-0.943	-7.15	-1.203	-0.684	**Gender**	-0.083	-0.320	-0.595	0.428
Int_1	0.313	6.85	0.223	0.403	**Int_2**	0.0789	0.8621	-0.101	0.259

Int_1 = Access X Work exp. Int_2 = Access X Gender

Table 3 presents the results of moderation analysis using PROCESS Macro Plugin in SPSS. The information shown in the table indicate that TEL access had a significant negative impact on TEL usage (β = -0.524, LLCI = -0.721, ULCI = -0.327) in the model. However, the inclusion of the moderator (Work experience) in the regression model resulted in a significant positive impact (β = 0.313, LLCI = 0.223, 0.403). Hence, the presence of the moderator modified the observed negative relationship to a positive one. In other words, the direction of the relationship/impact of access on TEL usage increases in the positive direction with increase in the levels of

work experience. This is graphically illustrated in Figure 1. Since 'zero' is not within the confidence interval of interaction term (Int_1) in Table 3, the moderating effect of work experience on the relationship between TEL Access and TEL usage is significant (Hayes, 2017).

Figure 1: Line Graph showing the moderating effect of Work Experience

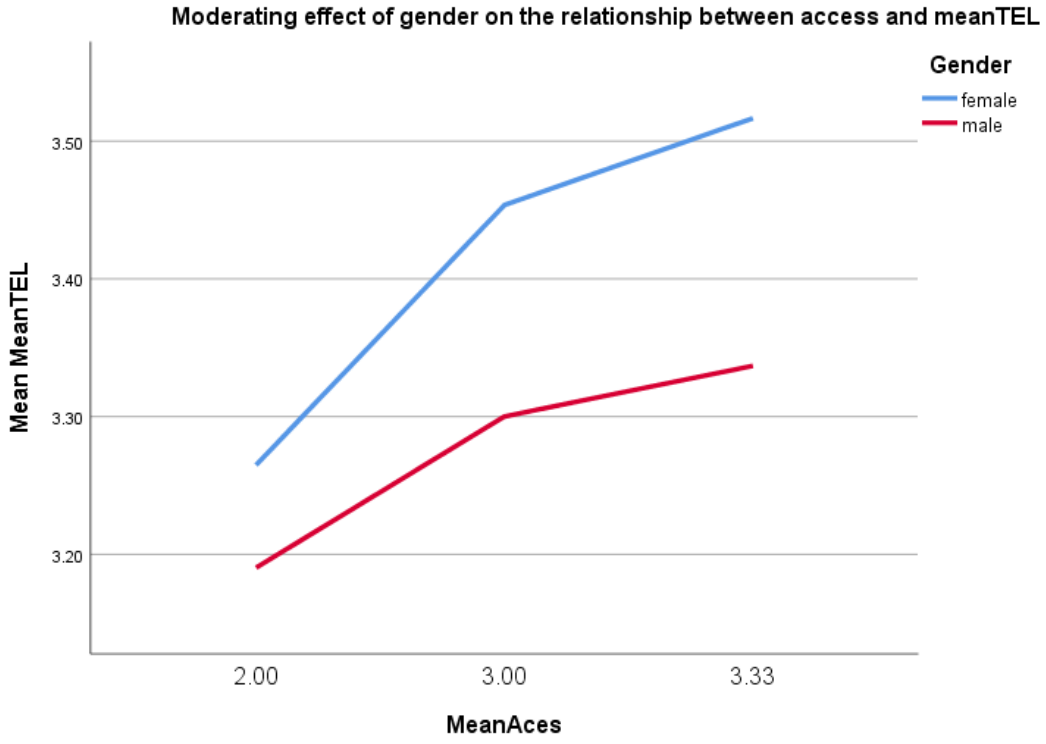


Hypothesis 2

Gender of VTE teachers moderates the relationship between their access to TEL resources and TEL tools experience.

With respect to gender, the results in Table 3 equally reveal that the weak positive effect of TEL access (β = 0.031) was slightly enhance with the inclusion of gender in the regression model (β = 0.078). This implies that the presence of the moderator (gender) enhanced the positive impact of TEL access on usage. However, the values of the confidence interval limits of the interaction term (Int_2, LLCI = -0.101, ULCI = 0.259) confirm that the moderating effect of gender is not significant.

Figure 2: Line Graph showing the moderating effect of Gender



The line graph shows that the slope of the blue line (representing females) is greater than the red line (for males). This suggests that the positive impact of access to TEL resources (MeanAces) on TEL tools experience (MeanTEL) is stronger for females than for males. However, the value of the interaction term (int_1) in the analysis summary is not significant ($\beta = 0.0789$, $p > 0.05$), meaning that the moderation of gender is not significant.

Discussion

The findings on institutional policies that promote the use of TEL resources shows that only Learning, Teaching, and Assessment policy promotes TEL. The other policy frameworks run in the studied TVET institutions including Virtual Learning Environment (VLE) usage policy, Faculty TEL policy, Guidelines for virtual learning environment services, and Electronic Management of Assessment (e-Assessment/e-

Submission) policy were responded to as not able to support TEL, even though their nomenclature somehow depict technology use in education. This scenario may be possible because the policy frameworks may be lacking the essentials of technology enabled learning environments as supported by Achieng and Kaunda-Arara (2022) that an institutional policy framework should be able to determine various important processes that need to be followed for obtaining relevant decisions, authorizations and approvals from relevant local authorities. Schifter (2009) asserts that effective policy frameworks should clearly give guide for relevant actions.

The result on the correlation between years of experience and access to most TEL resources showed a moderate positive correlation but indicate a strong negative correlation between years of experience and access to computers. This result implies that as one gains more experience in the employment ladder, the TEL resources needed or accessed increases, however, for the computer, it is a primary tool irrespective of the years of experience. This supported by Zarrabi, Mohammadi, and Seifoori (2024) that professional identity is a strong predictor of ICT use.

Findings on the moderating effect of years of experience of VTE teachers on their access to TEL tools and their TEL tools experience, reveals that with veteran teachers there is a positive relationship between access and experience with TEL tools, than it is with intermediate teachers. This is a slight shift from the report of Sera-Sirven(2021), that the lack of knowledge on new technology made teachers feel ineffective in the classroom; and that Veteran teachers noted frustration levels with implementing to use technology in their everyday delivery of their lessons. However, this findings provides practical implications for higher vocational college managers to promote positive teachers' ICT teaching behaviors (Yang, Guo, & Cui, 2023).

Findings on the moderating effect of gender on the relationship between access to TEL resources and TEL tools experience revealed that the moderation of gender is not significant. This is supported by Qazi, Hasan, Abayomi-Alli, Hardaker, Scherer,

Sarker, Paul, and Jaafar (2022), in similar study using a random-effects model which uncovered a small and positive, yet not significant, effect size with respect to gender (Male & Female).

Recommendations

1. TVET institutions should ensure that Policy Frameworks that support Technology Enhanced Learning are developed and used for efficient TVET delivery.
2. Administrators of TVET institutions should engage teachers with teaching and learning experiences that will expose them to more TEL resources.
3. TVET institutions should not engage in inequality issues regarding Gender in the use of TEL tools by TVET teachers.

Conclusion

Based on the findings of this study, many institutional policy frameworks run in TVET institutions do not promote technology enabled learning, hence a definite revision is needed for efficiency. There is also a slight positive correlation between years of experience and access to TEL resources, implying that the more the technological experiences of teachers, the more they are exposed to higher technologies. This is further proved in this study as it revealed that veteran teachers access to TEL tools and experience have a positive relationship. It is also confirmed in this study that there is more or less no significant difference in the use and access to TEL resources as regards gender.

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Authors' Contributions

Ibezim, Nnenna. E. wrote up the manuscript, was involved in instrument development and data collection.

Nwandu, Lilian O. was involved in instrument development, data collection and final reviewing of the manuscript.

Okadi, Ashagwu O**.** was involved in instrument development, data collection and final reviewing of the manuscript.

Ohanu, Ifeanyi. B. was involved in instrument development, data analysis and final reviewing of the manuscript.

Orji, Chibueze T. was involved in instrument development, data collection and final reviewing of the manuscript.

Chukwuone, Chiamaka. A. was involved in instrument development, data collection and final reviewing of the manuscript.

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Osinem, Emmanuel C. was involved in supervising the entire process of instrument development, data collection & analysis and final reviewing of the manuscript.

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