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**LECTURERS' PERCEPTION TOWARDS INTEGRATING ICT INTO TEACHING  
AND LEARNING DURING THE POST-COVID ERA**

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## LECTURERS' PERCEPTION TOWARDS INTEGRATING ICT INTO TEACHING AND LEARNING DURING THE POST-COVID ERA

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### **Abstract**

*The COVID-19 outbreak caused a major shift in the field of education, as it moved from the conventional traditional classroom to an online virtual classroom, which was novel to both teachers and students. This significant change has emphasized the need for incorporating technology in education, and teachers are now expected to adapt to the new mode of teaching. In this regard, the study investigates lecturers' perceptions towards the integration of ICT for teaching in Nigeria during the post-COVID-19 era. A descriptive survey research design was employed for the quantitative analysis of 138 Lecturers from the three federal colleges of education in Southwest Nigeria. The findings of the study present a constructive summary of teachers' perception towards the integration of ICT in teaching and learning in the post-covid era. The results revealed that lecturers had a positive perception towards integrating ICT into their teaching activities because it increases their productivity in lesson presentation, makes learning more concrete and interesting, enables them to manage instructional time very well, makes learning more engaging and diverse as well as helping students understand what is been taught. The finding also shows that lecturers do not have adequate ICT tools such as online assessment tools, video collaboration tools, internet, presentation software, learning management systems and interactive whiteboards readily available for effective teaching and learning. Significant differences in perception were found among teachers based on age, gender and teaching experience and educational qualifications. Therefore, heads of institution should make ICT tools readily available to support teaching activities. Also, the Federal Ministry of Education and TETFund should continuously fund the acquisition and build a good ICT infrastructure in Colleges of Education.*

### **Introduction**

The COVID-19 pandemic has upended the world as we knew it, and the education sector has been no exception. Schools and universities worldwide were forced to adopt new teaching and learning methods in the face of the pandemic. This has led to a significant increase in the use of Information and Communication Technology (ICT) in education, with teachers being at the forefront of this

shift, adapting their teaching practices to incorporate new technologies and explore innovative teaching methods in the classroom. Several teachers have had to adapt to this new way of teaching, grappling with the sudden change and adjusting their teaching practices to accommodate online and blended learning. Some have embraced the change and see ICT integration as a way to enhance learning outcomes, while others view it as a necessary evil to survive in the post-COVID era.

The use of Information and communication technology (ICT) in the classroom is a crucial component of teachers' development of their pedagogical practice skills and it has revolutionized the traditional methods of teaching and learning, providing numerous opportunities for both students and teachers. ICT has made instructional practices more interactive and productive (Lin et al., 2017), as it provides a variety of tools that are used in both traditional and online teaching spaces and aids in the development of a hands-on classroom environment (Jogezai et al., 2021).

ICTs are essential for promoting creative teaching and learning in education, and they have a significant role in bridging the gap between teacher-centred and student-centred teaching methods (Asenso-Okyere and Mekonnen, 2012). By using ICTs in the classroom, teachers can shift from solely transmitting knowledge to facilitating the learning process through collaboration, coaching, knowledge negotiation, and co-learning, thus empowering students to take on more responsibility for their own learning (UNESCO, 2010). Further, it will improve teaching quality (Akram et al., 2021a), and allow students to grow their abilities, increase their motivation, and expand their knowledge and information more quickly (Chen et al., 2018).

During the COVID-19 lockdown, when all human activities were prohibited, ICT played a supporting role in sustaining teaching-learning activities on the one hand (Thaheem et al., 2021) and on the other hand, as a substitute for face-to-face instruction. ICT-integrated teaching and learning provided a flexible approach and greater access to learning possibilities (Akram et al., 2021b). The integration of ICTs in the classroom has shown the potential to transform the role of students from passive recipients of information to active participants in the learning process. This shift in roles allows teachers to become "guides on the side" instead of "sages on the stage," enabling students to be more productive, creative, and innovative (UNESCO, 2010). Also, ICTs facilitate effective communication between teachers and students, which was not possible before (Dawes, 2001; Bingimlas, 2009), and it offers learners the opportunity to learn at their own pace and within the context of their own environment, thus reducing the limitations associated with

traditional learning settings (Pearman and Chang, 2010). Overall, the integration of ICTs has the potential to promote participatory teaching and learning, lifelong learning, and student-centred learning, which are all essential components of learning in the post-covid era.

The COVID-19 pandemic caused major disruptions to the education system in Nigeria, and as a result, schools were closed down for a significant period of time, which has led to a shift towards online learning and the integration of ICT in education. Schools, colleges, and universities adopted digital technologies to deliver instruction, conduct assessments and interact with students. With the use of ICTs, students and teachers had access to various online resources, such as e-books, videos, and webinars, which supplemented traditional classroom instruction (Abdullahi et al., 2020), and this has expanded the learning opportunities for students, especially those in remote or underserved areas, who may not have access to traditional learning resources. There was also the use of virtual classrooms and video conferencing platforms, such as Zoom and Google Meet, for remote teaching and learning. A study conducted by Arogundade and Ogunleye (2020) found that teachers in Nigeria used video conferencing platforms to deliver lectures and interact with students, which helped to maintain academic continuity during the pandemic. Notwithstanding the successful implementation of ICT integration for teaching during the pandemic, there have been challenges in the successful implementation of online teaching and learning in Nigeria after the pandemic. One crucial factor that could affect the success of ICT integration is the perception of teachers towards its use in the classroom. This study will appraise the status of ICT integration into teaching and learning by exploring the perception of teachers in further integrating ICT in the classroom, and the degree of the availability of ICT tools in schools.

### **Research Questions**

The study was conducted to answer the following research questions:

1. What ICT tools are available for teachers
2. What are teachers' perceptions towards ICT integration into teaching and learning in the post-COVID era?

### **Hypothesis**

The following hypothesis will be tested in this study

1. Are there any significant differences between teachers' background characteristics (gender, age, academic qualification, teaching experience and training in ICT) and perceptions of the integration of ICT into teaching and learning

## **Literature Review**

### **Benefits of ICT in Education**

Information Communication Technology refers to all electronic technologies and methods utilized to manage knowledge and information. It is a universally accepted truth that the pace at which ICT progresses and its impact on socioeconomic activities cannot be overlooked. ICT has become a crucial component in the creation of wealth globally, permeating nearly every aspect of commerce, government, and civic life in developed nations. This integration has undoubtedly revitalized all spheres of life, including education. Incorporating ICT in education enhances the essence of education by making learning more concrete and applicable to the technologically-driven world that learners inhabit. This makes it critical to integrate ICT elements and components in classroom practices to advance pedagogical approaches for better teaching and learning.

ICT-based resources and equipment can improve the instruction of all subjects, including languages, science, mathematics, humanities, arts, and other major disciplines. Likewise, ICT offers additional support and resources for both educators and students, promoting constructive learning by using computers as learning tools. The integration of ICT in education has several advantages, such as improving pedagogical methods, classroom interaction, quality classroom delivery, and enhancing the management of educational systems. To achieve the best results, it is necessary to select the appropriate ICT available that best suits a class and use it appropriately to fit into the lesson delivery for better understanding. Teachers must have in-depth knowledge and understanding of available ICTs and expertise in utilizing them to successfully incorporate them into teaching and learning and they are expected to integrate ICT to achieve specified objectives, using appropriate ICT materials and methods for better lesson delivery.

In order to promote teaching and learning efficiency, educators must incorporate ICT into their daily activities. The increasing use of ICT in educational institutions is evidence of its significance in education. Fan and Ho (2012) identify three main academic applications of ICT. First, ICT software can be used to improve teaching and learning. Second, it can be used to facilitate other

teaching roles, such as marking and student record management, to monitor learners' academic experience and progress. Third, ICT can be used to develop students' data literacy.

The use of computers in classrooms has enabled "individualized interactivity," according to Osin (1998), where students are provided with customized information and presentations tailored to their needs and interests. Both teachers and students can benefit from the integration of ICT systems, which can help to enhance and improve the quality of education by providing educational support for challenging subject areas. Teachers need to actively engage in collaborative projects to achieve these goals and develop strategies for action improvement, including the use of ICT collaborations as a resource.

According to Zhao and Cziko (2001), there are three requirements for teachers to incorporate ICT into their classrooms: they must have faith in the effectiveness of ICT, believe that using ICT will not cause disruption, and have confidence in their ability to control the use of ICT. Despite strong support for the potential of ICT to improve learning environments, as noted by Smeets (2005), many educators fail to take advantage of its potential. Harris (2002) conducted case studies on innovative ICT-related pedagogical methods in three lower primary and senior secondary schools. According to Harris (2002), the significance of ICT can be achieved when dedicated educators explore new approaches to improve classroom strategies using ICT. Using ICT not only enhances learning environments but also prepares the next generation for their future lives and jobs (Wheeler, 2001).

Educational institutions can provide online access to learning resources using specialized websites that are available at any time. In some educational institutions, students are not even required to be physically present. With the increasing popularity of virtual classrooms as internet connectivity improves, significant obstacles of distance and time are almost obsolete (Stennes, 2008). Another benefit of using ICT in education is that it enriches communication among teachers, teachers and students, and students with each other. This strengthens cooperation and moves away from the previous teaching approach of "banking," in which information is only transferred from teachers to students, with no room for critical thinking (Hawkins, 2002).

Balanskat et al. (2007) note that the most significant improvement in ICT integration in education has been achieved in recent years, resulting in educators' positive attitudes toward its use. Teachers are increasingly using ICT to prepare for their work and save time. The success of integrating ICT

into the classroom determines the benefits of its use (Condie & Munro, 2007). UNESCO (2007) claims that incorporating ICT into education systems has the potential to improve educational quality and promote greater access to knowledge and services for disadvantaged groups and communities. Therefore, ICT could be used effectively to make education simpler, less expensive, free of range limitations, and improve academic success by enhancing teaching and learning.

### **Teachers' perceptions of ICT integration in the classroom in the post-COVID era.**

The integration of Information and Communication Technology (ICT) in classrooms in the post-covid era has become an increasingly common practice in education in Nigeria. However, the effective integration of ICT depends on various factors, one of such includes teachers' perceptions of its benefits and challenges. Several studies have shown mixed feelings and varying levels of perception among teachers.

According to Zhao, Lei, Yan, Lai, and Tan (2005), teachers' perception of technology integration in the classroom plays a critical role in the successful implementation of technology. Teachers' attitudes towards technology can significantly impact their willingness to use technology in their teaching practices. It has shown that teachers' perception of ICT in the classroom has a significant impact on its implementation and success, and teachers who view ICT as a useful tool for teaching and learning tend to use it more effectively, while those who perceive it as a burden or a threat to their traditional methods may resist its integration into their teaching practice.

A study conducted by Huang et al. (2021) found that teachers who perceived ICT integration as beneficial to their teaching practices were more likely to incorporate technology into their teaching practices. This finding emphasizes the importance of teachers' perceptions of technology integration in facilitating effective integration of ICT in the classroom. Further, teachers' perceptions of technology integration are not only influenced by their own beliefs but also by external factors such as students' attitudes towards technology. According to Law et al. (2002), students' attitudes towards technology can significantly impact teachers' perceptions of ICT integration in the classroom. Students who are more receptive to technology are likely to encourage teachers to use technology in their teaching practices. Also, teachers' attitudes towards ICT can also be influenced by various factors, including their prior experience with technology, their confidence in using ICT, their beliefs about the role of technology in education, and their access to ICT resources.

Huang and Liaw (2005) in a study conducted across six European Union nations found that teachers' perceptions of ICT use had a positive influence on their ability to identify the benefits of using ICT in education. Similarly, Rozell and Gardner (1999) discovered that there was a correlation between teachers' ICT knowledge and experience and their perceptions of integrating ICT into the classroom. In the same way, Eugene (2006) used an observational methodology to investigate educators' expectations and perceptions of using ICT in the classroom, the findings revealed a disparity between instructors' expectations and perceptions of ICT use in the classroom. A similar study conducted by Simonson (2004), examined the perspectives of high school teachers and discovered a link between educators' perceptions and their use of ICT in the classroom. Simonson's (2004) claim was supported by Drent and Meelissen (2008), who cited a study of 210 instructors that discovered a correlation between teachers' technology use and favourable views towards the use of ICTs and innovative use of ICTs in the classroom.

Adeoye and Adegbiyi (2020) observed that while teachers in Nigeria recognize the importance of ICT in education, there are challenges with ICT integration, such as a lack of technical skills, inadequate access to technology, and limited training opportunities. The study revealed that teachers with prior experience using ICT are more likely to integrate technology into their teaching practices. Another study by Adu and Olatomide (2021) reported that many teachers in Nigeria were not adequately prepared to use technology for teaching during the pandemic. They found that teachers lacked adequate training, technical support, and access to necessary hardware and software. Similarly, Adelakun and Adu (2021) revealed that some teachers in Nigeria were hesitant to adopt ICT in their teaching practices, citing a lack of interest and support from school administrators, as well as limited access to the necessary technology and internet connectivity.

Prior to the outbreak of the COVID-19 pandemic, e-learning adoption varied among educational institutions in Nigeria. However, the pandemic made the adoption of online learning imperative, leading to many schools and institutions mandating their teachers and instructors to deliver curriculum online. This caused a paradigm shift with many teachers being forced to integrate ICT into their teaching activities. Against this backdrop, this study aims to investigate the perception of teachers towards the integration of ICTs for teaching in Nigeria during the post-COVID-19 era.



## **Relationship between teachers' demographic characteristics and perception towards ICT**

According to several research (Mahdum et al., 2019; Padmavathi, 2013; Semerci & Aydin, 2018), there is a correlation between teachers' demographic characteristics, such as age, teaching experience, ICT training, qualification, and gender, and how they perceive the use of ICT in the classroom. The length of time a teacher has spent in the classroom, as defined by Bingimlas (2009), may have an impact on how well they can incorporate ICT into their pedagogical practices. Lack of teaching experience is a significant teacher-related barrier to ICT integration. The use of computers in teaching methods and practises is significantly hampered by a teacher's lack of experience. According to Tezci (2009), if teachers are experienced, there will be more use of ICT in the classroom. The main obstacle to ICT adoption in education, according to Pelgrum and Law (2001), is a dearth of technical expertise among teachers in developing nations.

According to a study by Kumar et al. (2008), age is a key factor in determining the adoption of ICT. Young (2000) argues that younger and less experienced teachers use computers more than older teachers, because they are more likely to be computer literate, to have received teacher preparation that is more technologically advanced, and because they are less likely to be hampered by ingrained habits, beliefs, or attitudes. Therefore, a correlation exists between instructor age and computer attitudes, claim Cavas et al. (2009). Notwithstanding, several studies suggest that age has no influence on teachers' usage of ICT (Al-Senaidi et al. 2009; Sim & Lau, 2014).

The level of prior ICT experience teachers have had during their careers may also have an impact on how they see the usage of ICT in the classroom. ICT integration in the classroom may undoubtedly be significantly hampered by instructors' poor prior ICT experience. According to Drent and Meelissen (2008), developing learner-centred educational practice is facilitated by gaining solid experience with ICT and changes related to ICT. According to Mahdum et al. (2019), instructors view the incorporation of ICT in the classroom favourably and reported that there is no statistically significant connection between ICT training and teacher perceptions. A survey of secondary school teachers carried out by Padmavathi (2013) shows that teachers had positive attitudes towards using computers. Age, gender, computer training, or the subject they taught had little impact on teachers' attitudes towards using computers. However, age, gender, computer ownership, teaching subject, instructor ability, and training seem to have a significant impact on how much teachers actually use computers. The study also discovered that teacher competency,

skill development, and home computer access are the main determinants of ICT integration in school instruction.

Semerci and Aydin (2018) investigated what Ankara high school teachers thought about using ICT in the classroom. They discovered that teachers have a positive outlook on utilizing ICT in the classroom. Additionally, they discovered that teachers' propensity to use ICT was not significantly different based on factors such as gender, age, teaching experience, ICT experience, ICT abilities, or the quantity of ICT training they had received. However, their ICT knowledge, ICT abilities, and the extent of their prior ICT training all significantly influence their negative attitude (ICT anxiety) towards the use of ICT in education.

### **Methodology**

The study adopted a descriptive survey research design. The target population for this study are all Federal Colleges of Education lecturers in Southwest Nigeria. One hundred and thirty-eight lecturers from the three Federal Colleges of Education (Adeyemi College of Education Ondo State, Federal College of Education (Special) Oyo State, Federal College of Education, Abeokuta, Ogun State) were sampled for this study. A questionnaire titled “Teachers’ Perception Towards ICT Integration in the Post-Covid Era” was utilized and was adapted from Osman and Mensah's (2022) structured questionnaire. It comprised 20 items using a four-point Likert scale, divided into three sections. The first section (A) collected demographic information from the respondents, the second section (B) inquired about the availability of ICT facilities for teaching and learning, and section (C) elicited responses on teachers' perceptions towards the integration of ICT in teaching and learning. The data were analyzed using frequency, percentages, mean, standard deviation, Pearson Product Moment Correlation, T-test and ANOVA.

## Result and Discussion of Findings

### Demographic Information of Respondents

Table 1: Demographic Information on the Distribution of Respondents

Parameters	Classification (N138)	Frequency (%)
<b>Gender</b>	Male	66(47.8)
	Female	72(52.2)
	<b>Total</b>	<b>138 (100.0)</b>
<b>Age</b>	20-29	25(18.1)
	30-39	47(34.1)
	40 & above	66(47.8)
	<b>Total</b>	<b>138 (100.0)</b>
<b>Qualification</b>	B. ED	28(20.3)
	B. A/B.SC	19(13.8)
	PGDE	12(8.7)
	M.ED	53(38.4)
	PhD	26(18.8)
	<b>Total</b>	<b>138 (100.0)</b>
<b>Years of Teaching Experience</b>	1-5years	32(23.2)
	6-10years	57(41.3)
	11&above	49(35.5)
	<b>Total</b>	<b>138 (100.0)</b>

As shown in Table 1, there are 138 respondents and their characteristics consisted of 66 (47.8%) male teachers and 72 (52,29%) female teachers. Eighteen percent are between 20 and 29 years, thirty-four percent are between 30 and 39 years while forty-seven percent are 40 years and above. Further, 57 (41.3%) respondents have 6-10 years of teaching experience, 32 (23.2%) and 49 (35.5%) respondents have 1-5 years and 11 years above teaching experience respectively.

## Research Question1: What ICT tools are available for teaching and learning

**Table 2: Available ICT tools used in teaching and learning**

ICT Tools	SA Freq. %	A Freq. %	D Freq. %	SD Freq. %	Mean	Std. Deviation
Computers	68(49.3%)	28(20.3%)	23(16.7%)	19(13.8%)	3.05	1.103
Social Media (Twitter, Facebook)	41(29.7%)	18(13.0%)	36(26.1%)	43(31.2%)	2.41	1.213
Online Assessment Tools (Kahoot, Quizlet)	10(7.2%)	12(8.7%)	86(62.3%)	30(21.7%)	2.01	.774
Video Collaboration Tools (Zoom, Microsoft Meet)	13(9.4%)	12(8.7%)	74(53.6%)	39(28.3%)	1.99	.867
Internet (Wi-Fi)	11(8.0%)	11(8%)	77(55.8)	39(28.3%)	1.96	.827
Collaboration Tools (Google Docs, Dropbox)	13(9.4%)	14(10.1%)	66(47.8%)	45(32.6%)	1.96	.899
Presentation Software (PowerPoint, Prezi)	10(7.2%)	14(10.1%)	68(49.3%)	46(33.3%)	1.91	.850
Learning Management Systems (Google Classroom, Moodle)	11(8%)	13(9.4%)	53(38.4%)	61(44.2%)	1.81	.909
Educational Apps in related subjects	6(4.3%)	16(11.6%)	13(74.6%)	103(74.6%)	1.46	.864
Interactive Whiteboards	2(1.4%)	13(9.4%)	21(15.2%)	102(73.9%)	1.38	.718

Decision mean = 2.5; overall mean = 2.0

According to Table 2, the average availability of ICT tools for teaching and learning is  $\bar{x}=2.0$ , indicating that the respondents disagreed on the availability of all ICT tools for teaching and learning. Regarding computers, 69.6% of respondents agreed on their availability, while 30.4% disagreed. The analysis also revealed that 42.7% of respondents agreed on the availability of social media platforms such as Facebook for teaching and learning, while 57.3% disagreed. Furthermore, the results indicate that the majority of respondents (81.9%, 84.1%, 79.6%, 82.6%, 82.6%) disagreed on the availability of Video Collaboration Tools (Zoom, Microsoft Meet), Internet (Wi-Fi), Collaboration Tools (Google Docs, Dropbox), Presentation Software (PowerPoint, Prezi), and Learning Management Systems (Google Classroom, Moodle), respectively, and the least available ICT tools are educational apps and interactive whiteboards.

This clearly demonstrates that teachers do not have adequate ICT tools for teaching and learning in Federal Colleges of Education. Okebukola (2018), Ojo and Olakulehin (2018) and Iji (2020) all suggest that Nigerian universities are facing challenges in utilizing ICT tools to enhance teaching and learning due to inadequate infrastructure and tools, which could limit the development of necessary digital skills, competencies and academic performance of students. This, therefore,

suggest that although teachers may have a favourable attitude towards integrating ICT in teaching, their ability to do so may be hindered by the lack of access to ICT tools and resources.

**Research Question 2: What are teachers' perceptions towards ICT integration into teaching and learning in the post-COVID era?**

**Table 3: Perception of teachers towards ICT integration for teaching and learning**

	SA Freq. %	A Freq. %	D Freq. %	SD Freq. %	Mean	Std. Deviation
Make lessons more interesting	73(52.9%)	53(38.4%)	6(4.3%)	6(4.3%)	3.40	.769
Makes lessons more concrete in class	70(50.7%)	49(35.5%)	10(7.2%)	9(6.5%)	3.30	.868
Increase productivity in lesson preparation and lesson update	30(21.7%)	88(63.8%)	10(7.2%)	10(7.2%)	3.00	.764
Make lessons more diverse	22(15.9%)	94(68.1%)	12(8.7%)	10(7.2%)	2.93	.731
Help students to understand what they have been taught	38(27.5%)	70(50.7%)	10(7.2%)	20(14.5%)	2.91	.963
Enable the teacher to manage instructional time very well	57(41.3%)	34(24.6%)	23(16.7%)	24(17.4%)	2.90	1.129
Gives the teacher more confidence in teaching	16(11.6)	96(68.8)	13(9.4%)	14(10.1%)	2.82	.766
Improves lesson presentation	12(8.7%)	99(71.7%)	16(11.6%)	11(8.0%)	2.81	.700
Motivate students in their learning	16(11.6%)	81(57.8%)	26(18.8%)	15(10.9%)	2.71	.812
Makes students attentive in class	33(23.9%)	32(23.2%)	46(33.3%)	27(19.6%)	2.51	1.062

Decision mean = 2.5; overall mean = 2.92

From the analysis of the data, as presented in Table 3, it could be inferred that teachers had positive perceptions of integrating ICT into teaching and learning. This agrees with the studies of Wenli et al. (2009), Kayes et al. (2014), Kinyamario and Mihyo (2016), AbdulRasid et al. (2016) and Gambrah et al. (2019) where the findings show that teachers in Bangladesh, Ghana, Singapore, Tanzania, and Malaysia had positive perceptions of integrating ICT into teaching and learning, as it was seen as a way to enhance student engagement, motivation, and learning outcomes. Teachers are crucial to the integration of ICT because their attitudes determine how much ICT is used in the classroom (Hong, 2016). The implication of this finding is that the lecturers will readily adopt ICT into teaching and learning giving the necessary training and resources.

A large percentage of respondents agreed that ICT makes lessons more interesting. This confirms the studies of Kozma (2008), Mayer (2009) and Okafor and Ezugwu (2018) where findings show that the use of ICT and online resources made lessons more interesting and engaging for the

student, leading to increased motivation and improved learning outcomes. According to Haddad and Drexler (2002), integrating ICT in teaching and learning increases academic zeal and fosters enjoyment, transforming students from passive consumers of knowledge into active creators of knowledge. Findings from this study also show that respondents agreed that ICT makes lessons more concrete and increase productivity in the lesson. This supports Obiefuna and Okwori (2015), Li and Hu (2017), Rong and Quan (2017), Yusuf and Yusuf (2017) and Jusoh and Simin (2019) that ICT can enhance students' understanding of different subjects, improve the pedagogical practices of teachers, and have a significant impact on teaching reform. Perrotta (2013) claims that the perceived benefits of using technology include giving students access to a wider variety of learning resources and tools and enabling them to become more motivated, engaged, autonomous, and responsive in their learning.

This study further reveals that teachers perceive ICT to help them manage instructional time very well, gives them more confidence in teaching and improve their lesson presentation. This corroborates with Kang and Im (2013), Şahin-Karasar (2015), Yüksel and Çağiltay (2016), Akar and Ustun (2017) and Mansfield, Belt and Price (2019) that teachers perceive that the integration of technology in the classroom can have a positive impact on instructional time management, increase their confidence in teaching, and improve student achievement. According to Balanskat et al., (2007), integrating ICT allows teachers to quickly and efficiently carry out tasks such as planning, revising regular lessons and maintaining class records. From the foregoing, it is significant to note that any successful integration of ICT begins with teachers' positive perceptions of its benefits in teaching and learning.

**Hypothesis 1: Are there any significant differences between teachers' background characteristics (gender, age, academic qualification and teaching experience) and perceptions of the integration of ICT into teaching and learning?**

**Table 4. Independent T-test showing the difference in gender and perceptions of integration**

	Variable	N	Mean	St. D	df	t	Sig	P	$\eta^2$
Perception	Male	66	23.65	6.909	136	12.32	.001	<.05	0.527
	Female	72	34.47	1.868					

Significance level 0.05

**Table 5: Analysis of variance showing difference between teachers' background characteristics and perceptions of integration ICT**

		Sum of Squares	df	Mean Square	F	Sig.	P
Age	Between Groups	64.320	2	32.160	456.626	.001	<0.05
	Within Groups	9.508	135	.070			
	Total	73.828	137				
Academic Qualification	Between Groups	59.667	4	14.917	140.097	.001	<0.05
	Within Groups	14.161	133	.106			
	Total	73.828	137				
Teaching Experience	Between Groups	43.985	2	21.992	99.484	.00	<0.05
	Within Groups	29.844	135	.221			
	Total	73.828	137				

Significance level 0.05

Table 4 reveals that there is a significant difference between gender and teachers' perception of ICT integration;  $t(136) = 12.79$ ,  $P < 0.05$ ,  $\eta^2 = 0.527$ . The table further showed that the mean rating of female ( $\bar{x} = 34.47$ ) differs slightly from and is higher than their male counterparts ( $\bar{x} = 26.65$ ) and the size of effect is  $\eta^2 = 0.527$ . This means that the variance that is been explained by gender on teachers' perception of ICT integration is large and the gender influence accounts for 52.7%. This, therefore, implies that female teachers are more likely to hold positive perceptions and hence integrate ICT into their teaching experience. This finding agrees with Kirschner and Wopereis (2016), Chen and Huang (2017) and Wang and Li (2018) that female teachers had more positive perceptions, higher confidence and willingness of integrating ICT into their teaching pedagogy than males. Similarly, Sung, Chang, and Liu (2019) corroborate that female teacher held more

positive beliefs and were more likely to use technology in their teaching practice due to greater exposure and experience with technology.

In Table 5 ANOVA analysis was used to determine the significant difference in the teachers' background characteristics (age, academic qualification and teaching experience) and perceptions of the integration of ICT into teaching and learning. It reveals that there is a statistical difference among the age group for perception;  $F_{(2, 137)} = 456.626$ ,  $P < 0.05$ . Tukey posthoc analysis was performed and the result showed that there were statistically significant differences in the perception of teachers age 40 years and above ( $\bar{x} -3.74$ ,  $SD = .173$ ) and 20-29 years ( $\bar{x} -1.59$ ,  $SD = .514$ ) and 30-39 years ( $\bar{x} -2.88$ ,  $SD = .163$ ). Thus, the older the teacher the more likely to hold positive perceptions and integrate ICT into teaching and learning. This agrees with the findings of Ertmer et al. (2012) and Teo (2012) that teachers who are older may have more experience and knowledge in teaching and therefore tends to have a positive attitude and are more likely to integrate ICT into their teaching practice. However, this negates the view of Young (2000) who argues that younger and less experienced teachers use computers more than older teachers, because they are more likely to be computer literate. Al-Senaidi et al. 2009, Sim & Lau, 2014, Bingimlas (2016) and Khechine (2006) also opined that there is no relationship between age and perception of ICT integration, since other factors such as experience, and training also play important roles.

The finding of the study also shows that there is a statistically significant difference in the perception of teachers according to their academic qualifications;  $F_{(4, 133)} = 140.097$ ,  $P < 0.05$ . it reveals that teachers with high academic qualifications have a positive perception to integrate ICT into teaching and learning. This finding supports the views of Chai et al. (2010), Wang and Hsu (2013), Abdullah et al. (2016) and Ma et al. (2016) that teachers with high academic qualifications possess the necessary skills, knowledge and have a more positive attitude towards integrating ICT into teaching and learning in a bid to enhance students learning. However, in the studies of Adedoja and Agun (2012), Ng'ambi and Lombe (2010), Lee and Wu (2010) and Tondeur et al. (2007) they argue that the level of teachers' academic qualifications does not necessarily translate into their ability to effectively integrate ICT into their teaching practices and that while academic qualifications may be an indicator of teachers' knowledge and skills, it does not necessarily reflect their attitudes towards ICT integration.



Furthermore, the result from the study shows that teachers with high teaching experience are more likely to hold a positive perception of integrating ICT into teaching and learning;  $F_{(2, 135)} = 99.484$ ,  $P < 0.05$ . there is a statistically significant difference between teachers with 11 and above years ( $\bar{x} -35.35$ ) with 1-5years ( $\bar{x} -31.66$ ) and 6-10 years ( $\bar{x} -22.77$ ) respectively. The finding agrees with Lee and Kim's (2017) claim that teachers who have more experience teaching are likely to view integrating ICT into teaching and learning positively. This is because they have a better understanding of how technology can be used pedagogically in the classroom. However, Akçayır and Akçayır (2017) offer an opposing perspective. They argue that a teacher's age and years of experience do not significantly predict their attitude towards ICT integration. Instead, the individual's level of technological competence and training are more influential in shaping their perception of ICT integration.

### **Conclusion**

Based on the research findings, it can be concluded that teachers have a positive perception towards integrating ICT into teaching and learning post-COVID and it is significantly influenced by their age, gender, academic qualifications, and teaching experience. The study reveals that older teachers tend to have a positive perception towards the integration of ICT, possibly because they see ICT as an opportunity to improve their teaching skills as well as keep up with the latest trend so as not to become irrelevant in their profession. Female teachers, exhibited a more positive attitude towards ICT integration, likely due to their higher level of comfort with technology, particularly with computers and mobile devices and also, their pedagogical approach is often more focused on learners and collaboration, leading them to view technology as a tool for improving learning outcomes, student engagement, and critical thinking.

The research findings also indicate that teachers with higher academic qualifications and more teaching experience have a more positive perception towards the integration of ICT. This could be attributed to their increased knowledge and their better understanding of the benefits of technology in education. Also, experienced teachers tend to develop a more open and flexible mindset toward new teaching methods such as ICT integration after the covid-19 pandemic.

The study shows that the most available ICT tools for use by teachers are limited to computers, social media and online assessment tools. This suggests that educators need to explore and utilize other ranges of ICT tools to enhance teaching and learning outcomes.

## Recommendation

The following recommendations are made based on the findings of the study and conclusions:

1. Heads of institutions should provide adequate ICT tools for use by lecturers and encourage them to use it effectively
2. The Federal Ministry of Education and Tetfund should continuously fund the acquisition and build a good ICT infrastructure in Colleges of Education.
3. Government and policymakers are to assist lecturers in adopting and utilizing various ICT tools to improve student's learning outcomes.

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