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EXPLORING THE INTEGRATION OF TECHNOLOGY IN SECONDARY SCHOOL CLASSROOMS IN OSOGBO, OSUN STATE

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Abstract

In the present-day Nigerian educational settings, technology is increasingly adopted, though there are mixed attitudes about integrating it into the instructional process among the secondary school teachers of Osogbo, Osun State. Therefore, the present study makes an inquiry into the relationship between perception, attitude, and some demographic variables of the teachers regarding technology use in the classroom. The study is informed by the theoretical anchorage on Self-Perception and Constructivism which involved 300 teachers randomly selected from three local government areas. There was a statistical gender difference in attitudes toward technology, with males being more positive. Age and teaching experience had a combined significant influence on the attitude of teachers toward technology integration. This study thus underscores the need for bottom-up decision-making processes in the effective integration of technology.

Key words: Perception, Attitude, Technology integration, Gender, Age, Year of experience.

Introduction

The rapid development of technology in the 21st century has changed different sectors to include education. Education is said to be the key to personal and national development. Figures like Nelson Mandela give support to this view, and extensive research also demonstrates the transformative nature of technology in education. This has become a major focal point for both policymakers and educators in Nigeria. As society becomes more and more digital, there is a call for the use of technology in the system of education from various sectors. Osogbo, the capital city of Osun State in Southwestern Nigeria, is of unique demographic and socio-economic characteristics and can thus be a microcosm to see these trends. Secondary education in Nigeria is very important because it is a very key transition between primary education and higher education or vocational training. The Nigerian National Policy on Education has the objective to make learners acquire skills and knowledge that will make them be competitive in the world of work (Federal Republic of Nigeria, 2013). Even as these directives take center stage, there has been an

increased dependence on the role technology can play in making the teaching and learning process better, more inclusive of the learners, and also enhancing their critical thinking abilities.

Another factor that might hinder the successful implementation of technology in the Nigerian classrooms at the secondary level, apart from infrastructural deficiencies, is the insufficiency of prepared staff members, and lack of internet availability, as well as socioeconomic differences, among others. This can hinder effective implementation. Unequal distribution of learning resources across regions heightens the digital gap, especially between the urban and the rural areas. All these, however, thwart effective implementation.

Some of the schools in Osogbo have considerably embraced information technology, while others are still using old methods and face challenges due to a lack of digital resources. In another effort, the government has taken some steps towards improving technology usage in schools through collaboration with private and international organizations. In order to support the exploration of the reality of the use of technology in classroom activities in Osogbo secondary schools, the following explorative dimensions should be taken into consideration.

This study is important for several key reasons. First, it would be essential in understanding how technology has currently been assimilated in Osogbo secondary classrooms and the effect it has on educational outcomes. With the growing importance of the level of education and literacy in the use of technology in the labor market, this research would make known to schools and teachers the best practices that either facilitate or impede successful technology integration (Eze & Chukwuemeka, 2021).

There are also differences in technology access and use among schools in Osogbo; hence, this study will provide critical evidence that can guide educational policies and approaches in the quest for equitable technology integration. It is expected that schools, which have effective technology plans, will have improved student outcomes over those with poorly resourced or no technology in terms of engagement, achievement, and readiness for future career challenges (Baker et al., 2021). The findings of this study may also inform content for in-service training for teachers on better use of technology for teaching. Indeed, the ability of teachers to use technology effectively will determine much of its success in pedagogical practice (Hennessy et al., 2020). Similarly, the revelation that most educators might lack adequate training distinguishes the existing gaps and implies targeted measures to help teaching staff.

In addition, an understanding of the influence of the socio-cultural factors of Osogbo on the use of technology in schools is also necessary to help create a favorable environment for integration. Cultural attitudes toward technology and education can greatly affect the reception and use of technological tools by students and teachers (Adeyemo & Adebayo, 2022). Thus, cultural interactions with trends in technology on the use of educational practices need exploration in the milieu. Even though there are improvements in technology, the integration of Information and Communication Technologies (ICT) into Nigerian schools is still below what it should be. The current study is conducted through the perceptions and attitudes of secondary school teachers in Osogbo regarding the use of technology in educational delivery.

Literature Review

Research globally proves a very powerful impact that technology has on education. Investing in educational technologies makes countries report improvements in student engagement and learning outcomes according to the Organization for Economic Cooperation and Development (OECD, 2021) report. This will lead to creating more collaborative, interactive learning environments, according to Warschauer (2021). These will make the acquisition of technology foster critical thinking and creativity.

The infusion of technology in educational settings has come out as an important area of study more especially in the secondary level where students are getting ready for higher education and careers. In light of this, the present paper reviews the use of technology in secondary classroom settings, particularly in Osogbo, Osun State. With the evolution of technology, its impact on education shifts regarding teaching methodologies, student participation, and academic outcomes.

Technological growth has greatly transformed educational models across the globe. Of note is the change being brought about by the integration of technology in the classroom to ensure better teaching and learning experiences. Research indicates that successful technology integration depends on how highly the educator views it and how skilled they are. A positive attitude toward ICT has been linked to its improved integration, as well as better performance by students (Teo, 2008; Derbyshire, 2003).

Shortcomings of the training and little experience will generally result in negative informational input, and hence, a negative attitude towards technological tools, and their applications and adaptations (Kumar and Kumar, 2013). Presently, accreditation bodies in Nigeria-NCATE-express an awareness of how much demand the use of technology is placing on the capacity of students to participate successfully in the digital economy, mirroring an international trend of standard educational outcomes toward digital literacies (Jegede & Owolabi, 2013). The Nigerian government has formulated several policies and initiatives to integrate technology into the education system. In addition to the launch of the Universal Basic Education program, which involves free and compulsory basic education for all children, the government also promotes the integration of technology into the implementation process (Federal Ministry of Education, 2013).

The use of technology in education is a broad concept that involves using all digital tools, software, and resources for learning and teaching. It is not just about computer use but entails the integration of various other technologies such as interactive whiteboards, learning management systems, virtual reality, and online platforms. Such technology has the capability to make learning quite interesting and interactive, provoking increased motivation on the part of students as well as active participation and, ultimately, better outcomes in education (Cuban, 2001; Dede, 2009). It also enables instructors to customize the experience of learning to satisfy the varied needs and preferences of learners (Roschelle & Pea, 2003; Thompson & Schell, 2009). Digital resources like online libraries, research databases, and multimedia materials open access pathways, enriching students' learning experiences (Mishra & Koehler, 2006). Technology integration fosters critical thinking, and problem-solving and enhances communication and collaboration. Hence, students become better prepared to face the challenges of the 21st-century job market (National Research Council, 2012).

Teacher Attitudes and Perceptions

Clearly, teacher attitudes toward technology were found to be very important in its adoption in the classroom. As Zhang et al. (2020) note, favorable attitudes toward technology increase the chances of its integration in lesson design and classroom activities. On the contrary, nonchalant or doubtful attitudes regarding technology could curb its usage in spite of its availability.

A study conducted by Bada and Olaniyi (2021) focused on the views of secondary school teachers in Osun State. It indicates that a lot of them thought very positively about the relevance of technology, but inadequate training and lack of resources make them somewhat hesitant to embrace it. This calls for focused training programs.

Learning outcomes are directly proportional to student engagement. Technology is a tool that assists quite effectively in increasing engagement. As assessed by the study conducted by Rahimi and Hussein (2021), online quizzes, collaborative platforms, and simulation software support enriched learning through active learning processes that are responsive simultaneously to in-depth comprehension by students.

In the Osogbo environment, instances of technology-accentuated learning have been noted. In this case study by Oluwole et al. (2022), we have a secondary school that put in place blended learning methodologies, which is essentially mixing the normal mode of classroom teaching with some digital resources. It was established that academic performance got better with increased levels of student motivation, thus proving how favorable effective technology employment can turn out to be.

The literature shows multiple advantages of using technology in secondary classrooms. According to Liu et al. (2020), technology creates an interesting learning environment and, in this case, variation in learning modalities, thereby catering to different learning styles. The study by Koutropoulos (2019) added to the evidence and explicitly stated that technology made it easier for personalized learning to take place, allowing students to learn at their own speed and according to specific interests.

It was also found that by Chen and Lim (2022), technology integration has a positive effect on fostering critical 21st-century skills, such as problem-solving, collaboration, and communication. Which of course would be necessary in order to succeed in the future, whether in higher education or in the world of the job market (Dede, 2018).

Not at all, the use of technology in classrooms comes without challenges. Teachers are still not adequately trained and prepared to support to merge technology into their pedagogical practices, as reported by Kafai and Peppler (2020). Due to this training gap, the resources available are underutilized, creating a tendency for the potential impact of technology on learning to be thwarted.

Within the Osogbo setting, all these challenges have been well documented in the literature. The study of Awoniyi and Buhari (2021) focused on socio-economic factors that impede technology integration in Osun State secondary schools, and results were indicative that scanty reliable internet and inadequacy of technological infrastructure in the academic setting were hindering the efforts of the educator. The authors distinctly state that this gap calls for policy interventions. Low access to technology tools such as computers, internet connectivity, and software can also be a barrier (Horn & Staker, 2015; Williamson, 2017). Effective integration of technology necessitates that teachers are well trained and feel comfortable using the technology itself (Cuban, 2001; Ertmer & Ottenbreit-Leftwich, 2010). Cuban (2001) reiterated that

setting up technology infrastructure and maintaining the same is resource-intensive and demands uninterrupted investment thus financial ordeal. The "digital divide," whereby specific communities lack access to technology and are not literate in its usage can serve to exacerbate already existing inequalities in educational opportunity fields (Selwyn, 2011).

It shows the factors that interact in a complicated way to influence the use of tech in secondary school classes in Osogbo, Osun State. Much as there are big pluses in using tech to make teaching better, problems in training teachers, infrastructure, and social-economic status remain. This calls for a concerted effort by educators and policymakers to facilitate proper integration by addressing the challenges at stake to ensure equitable access for all students to the advantage that technology in education brings.

Methodology

The design of this research involved the development of a questionnaire that was handed out to 300 secondary school teachers. These teachers were chosen by random sampling from ten schools located in Osogbo. The data that was collected was later analyzed using such statistical techniques as T-tests, Multiple Regression, and Pearson Product Moment Correlation, to find out the effect of demographic aspects such as age and teaching experience on attitudes towards technology integration. The target population of this research consists of secondary schools in Osogbo involving teachers and students. Participants were selected using a stratified random sampling technique from private and government schools, thus ensuring different socio-economic backgrounds were fairly represented. In this paper, the sample comprises 300 students and 50 teachers, enough to give a representative demographic for analysis. The development of a structured questionnaire elicited information on teachers' and students' perceptions regarding the integration of technology into the classroom. The questionnaire featured Likert-scale questions regarding the use of resources like digital materials and the availability of all resources plus possible benefits and difficulties. A pilot test was conducted to validate this questionnaire in an educational setting similar to the present one.

Findings

Hypotheses I: There is no significant difference between the male and female teacher's attitude towards technology integration for instructional delivery. This hypothesis was analyzed using independent sample T-test and the result is presented in Table below

Summary Of T-Test Showing the Gender Difference on Attitude Towards Technology Integration for Instructional Delivery

	Gender	N	\bar{X}	SD	Df	T	P
Attitude towards technology integration	Male	129	20.82	4.85	298	2.094	<.05
	Female	171	19.70	4.37			

Table 4.7 shows that gender significantly influence attitude towards technology integration for instructional delivery [$t(298) = 2.094$; $p < 0.05$]. The result indicated that male teacher reported higher attitude towards technology integration for instructional delivery (Mean = 20.82; SD = 4.85) compared to

their female counterpart (Mean = 19.70; SD = 4.37) who reported lesser attitude towards technology integration.

Hypotheses II: There is no significant relationship between Teacher's perception of the uses of technology for instructional delivery and attitude towards technology integration for instructional delivery. This hypothesis was analyzed using Pearson product moment correlation and the result is presented in table below

Pearson product moment correlation showing the relationship between the use of technology on attitude towards technology integration for instructional delivery

	N	Mean	SD	Pearson r	Sig.	Remark
Uses of technology	300	20.18	4.61			
Attitude towards technology	300	25.89	5.03	.163	<.01	Significant

Table shows that there was significant relationship between teacher's perception of use of technology for instructional delivery on attitude towards technology integration for instructional delivery ($r = .16$, $p < .01$). This shows that increase in the use of technology will significantly increase attitude towards technology integration for instructional delivery.

Hypotheses III: There is no significant relationship between teachers' perception of technology integration on attitude towards technology integration for instructional delivery. This hypothesis was analyzed using Pearson product moment correlation and the result is presented in table below

Pearson product moment correlation showing the relationship between perception of technology integration on attitude towards technology integration for instructional delivery

	N	Mean	SD	Pearson r	Sig.	Remark
Perception of technology integration	300	20.18	4.61			
Attitude towards technology	300	18.46	5.71	.185	<.01	Significant

Table 4.9 shows that there was significant relationship between perception of technology integration and attitude towards technology integration for instructional delivery ($r = .19$, $p < .01$). This shows that increase in the perception of technology integration will significantly increase attitude towards technology integration for instructional delivery.

Hypotheses IV: Age and teaching experience will jointly and independently influence on attitude towards technology integration for instructional delivery. This hypothesis was analyzed using multiple regression analysis and the result is presented in Table below

Summary of Multiple Regression Table Showing Joint and Independent influence of age and teaching experience on attitude towards technology integration for instructional delivery

Predictors	B	T	p	R	R ²	F	p
Age	-.197	-2.596	< .05	0.193	0.373	5.75	<.05

Teaching experience	.254	3.354	<.05
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Table 4.10 shows that there was significant joint influence of age and teaching experience on attitude towards technology integration, $F(2,297) = 5.75$, $R^2 = 0.37$; $p < .05$]. The $R^2 = 0.37$ indicates that the independent variable age and teaching experience explained 4% variation in dependent variable (attitude towards technology integration). Further results show that age ($\beta = 0.20$; $t = 2.60$; $p < .05$) and teaching experience ($\beta = 0.25$; $t = 3.35$; $p < .05$) independently predict attitude towards technology integration for instructional delivery.

Findings Discussion

Perception and attitude toward technology integration for teaching and learning were the focus of this study. It was examined whether the participants also agree on the benefits of integrating technology into instructional delivery.

Demographic Information of Teachers

Information about the teachers' demographics, comprising gender, age, years of experience, educational level, and area of specialization, indicated that most of the respondents were females, with 57.0% against 43.0% males. There was no significant issue about the importance of gender in the increasing percentage of female teachers. Almekhlafi and Almeqdadi (2010) argued that technology is a unidirectional tool; it depends on the attitude and perception of the user. However, according to Hohlfeld et al. (2013), gender is unidirectional through the population of the gender that mainly takes the teaching environment; this does not come into play on the use or integration of technology in a classroom setting.

Teachers' age was grouped into four categories as presented in Table 4.2, which indicates that 32.3% of teachers were between 18 and 30 years old, 42.7% were between 31 and 40 years old, 20.3% were between 41 and 50 years old, and 4.7% were between 51 and 60 years old. The years of working experience of teachers as presented in Table 4.3 show that 30.0% of teachers had an experience of 1-10 years, 55.7% had 11-20 years of experience, and 14.3% had experience of above 21 years.

This information on the demography of the participating teachers should be considered as adequate and reliable.

As shown in Table, more than half of the teachers who took part in the survey have a bachelor's degree (51.7%). Other qualifications include an NCE with 24.3% representation, a master's degree with 22.3% representation, and the least represented group are those with doctoral degrees at 1.3%. From the areas of specialization of the teachers: 42.3% are Art teachers, 39.3% are Science teachers, and 18.3% are Commercial teachers. In the devices used for teaching, Table shows that the majority of teachers use mobile phones for teaching (27.0%), tablet/iPad (19.0%), computer (13.7%), laptop (11.7%), E-book reader (11.7%) and iPhone (11.0%) for teaching, while 6.0% of the respondents use android for teaching.

Male and Female Teachers' Attitude Towards Technology Integration for Instructional Delivery

The null research hypothesis is that 'there is no significant difference between the male and female teacher attitude towards technology integration for instructional delivery.' This hypothesis was tested with an independent sample T-test. The resulting test ($p < 0.05$) shows that gender significantly influences attitude toward technology integration for instructional delivery [$t(298) = 2.094$]. It was inferred that male teachers had higher ratings of attitude toward technology integration for instructional delivery (Mean = 20.82; SD = 4.85) compared to their female counterparts, who had lower ratings (Mean = 19.70; SD = 4.37) on the same.

Research on the attitudes of male and female teachers indicates that gender variations in approving technology integration for instructional delivery are evident. Precisely, female educators are more convinced about the adoption of interactive teaching models. On the other hand, male teachers show more confidence in the use of traditional pedagogical practices.

A scrutiny of the gendered expectations of males and females in society reveals many reasons why it is more probable that female teachers will integrate technology into their classrooms more than men. Because of who society expects women and men to be, females are considered to be emotional, subjective, and nurturing and males to be rational, objective, and logical (Dominici, P. (2018). These variations in assumed female and male behavior are reflected in education.

Computer usage has changed the way teachers approach teaching and learning (Mundy et al., 2012). Although not much technology equipment is in use in the Nigerian educational system, the teachers with access to technology are changing the way. The scores generated indicate there is a significant difference in the teachers' gender and attitude regarding the integration of technology in Osogbo. Therefore, the null hypothesis is rejected.

Perception of Teachers on the use of Technology and Attitude to Technology Integration for Instructional Delivery

The research hypothesis, which is two, stated that there is no significant relationship between teachers' perception of the use of technology for instructional delivery and attitude towards technology integration for instructional delivery.

The table shows a significant relationship between a teacher's perception of using technology in instructional delivery and their attitude toward technology integration in instruction. Essentially, an increase in the perceived usefulness of technology would significantly raise a teacher's attitude toward technology integration in instruction. Statistics indicated a positive correlation between the use of technology and attitudes about it by teachers. The analysis supported Machado and Chung (2015), who posit that there is nothing that teachers set out to do that cannot be achieved. The classroom setting shifted from the traditional lecture and learn method to an environment based on students, according to which the students themselves take control of their learning, so the null hypothesis is rejected.

Teachers' Perception of Technology Integration on Attitude Towards Technology Integration for Instructional Delivery

The research hypothesis three which stated that there is no significant relationship between teachers' perception of technology integration on attitude towards technology integration for instructional delivery. This hypothesis was analyzed using Pearson product moment correlation.

Table 4.9 shows that there was a significant relationship between the perception of teachers towards integrating technology for instructional delivery and attitude towards technology integration for instructional delivery ($r = .19$, $p < .01$).

This result shows the increase in the perception of technology integration will significantly increase attitude towards technology integration for instructional delivery. This is an indication that perceive usefulness of Integrating technology by the Nigeria secondary school teachers is relatively high. This supports the report by (Gray and Souter, 2004) that teachers came out positively with regards to the use of ICTs. It also confirms the assertion that availability usually determines access. If the ICTs are available, this will motivate the teachers to access them than when they are not available or available but not in sufficient quantity and quality. Similarly, Cox et al, (2014) identified factors which were found to be most important to teachers in their teaching which include: making the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable. Additionally, more personal factors were improving presentation of materials, allowing greater access to computers for personal use, giving more power to the teacher in the school, giving the teacher more prestige, making the teachers' administration more efficient and providing professional support through the Internet. All these may be responsible for the relatively high attitude to the use of ICT by Nigeria teachers. therefore, the null hypothesis is rejected.

Age and teaching experience will jointly and independently influence on attitude towards technology integration for instructional delivery.

The fourth research hypothesis stated that Age and teaching experience will jointly and independently influence attitude towards technology integration for instructional delivery. Table 4.10 results show that age and teaching experience significantly influence attitude towards technology integration, [$F(2,297) = 5.75$, $R^2 = 0.37$; $p < .05$]. The $R^2 = 0.37$ indicates that the independent variable age and teaching experience explained 4% of the variation in the dependent variable (attitude towards technology integration). Further results show that age ($\beta = 0.20$; $t = 2.60$; $p < .05$) and teaching experience ($\beta = 0.25$; $t = 3.35$; $p < .05$) independently predict attitude towards technology integration for instructional delivery

This is not random, but can be seen: People who are 40 and below are young teachers who have had these tools in their higher learning and have better mastery of it than those between 41 to 50 years. Also, it can mean that the 50+ teachers are old timers and are still learning new tech just to stay employed.

A study by Ghavifekr and Rosdy (2015) looked into the age of teachers as well as their experience in technology integration for instructional delivery and their attitudes toward technology. The researchers

hypothesized that age and teaching experience would jointly and independently influence on attitude towards technology integration for instructional delivery.

Two samples of secondary school science teachers (N = 68) in grades 7-12, were taken: either a sample of younger bachelor-level teachers (< 30 years old) with less than 5 years of experience teaching or a sample of older master's degree-level teachers (> 35 years old) with more than 10 years of teaching experience (N = 53).

The results of this study support the argument for the positive correlation that exists between age and attitude toward technology. Regarding this, the younger teachers' attitudes were more positive compared to their older counterparts. Older teachers had more positive attitudes toward the use of technology in teaching. This study also established a positive correlation between teaching experience and attitude toward technology integration.

In the research question there is evidence that a relationship exists, but issues of weakness and strength were not part of this study which was focused on relationships, and not the cause and effect. The null hypothesis is therefore accepted.

This means that technology integration is possible in the future of education. The only part that needed more focus and training for improvement would be knowing the systems that support teaching and learning in the classroom, and having a good attitude toward technology integration.

Conclusion

This study highlights the critical role of teachers' attitudes and perceptions in the successful integration of technology in classrooms. For meaningful integration, stakeholders must prioritize inclusive training programs that cater to varying demographic factors among teachers. The results advocate for a collaborative approach in decision-making processes concerning technology adoption in schools to align with modern educational needs and enhance overall student achievement.

Recommendations

To foster a more positive attitude and effective integration of technology in education, it is recommended that:

- 1) Teachers participate actively in decision-making processes regarding technology adoption.
- 2) Training programs focus on both skill enhancement and attitude transformation.
- 3) Further research explores the impact of continuous professional development on technology integration in schools.

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