**CHAPTER ONE**

**INTRODUCTION**

* 1. **Background of the Study**

Over the past two decades, technology has greatly changed education around the world. Starting from the use of computers and multimedia tools to more advanced systems like online learning platforms and artificial intelligence, these digital tools have changed how teaching and learning happen. Educational technology has made it easier to create flexible, student-focused learning that supports critical thinking, teamwork, and creativity. In many developed countries, technology is now a key part of their education plans, helping improve how lessons are taught, how students' progress is tracked, and how inclusive learning is achieved.

Developing countries like Nigeria have also recognized the potential of integrating technology in education to bridge educational gaps and improve student performance. That is why the Federal Ministry of Education commemorated the 2025 International Day of Education by embracing the theme “AI and Education: Preserving Human Agency in a World of Automation.” The Ministry has restated its dedication to using the power of AI to improve education in Nigeria. By focusing on innovation and using AI responsibly, it hopes to make learning more open, effective, and creative for everyone in the country. National initiatives, including the *National Policy on ICT in Education*, were designed to enhance access, equity, and quality of education through the effective use of information and communication technologies (Federal Ministry of Education, 2019).

These efforts are meant to improve education, reduce unfair differences in learning, and help students gain the skills they need for today’s world. However, how well these plans work depends on things like school buildings, money, and how prepared the teachers are, which can be very different from one place to another.

However, the implementation of such policies often faces challenges at the grassroots level. Across Nigeria, and particularly in regions like Edo South Senatorial District, infrastructural and socio-economic disparities create a digital divide between schools in urban centers and those in rural or underserved communities. While some schools in cities may benefit from computer labs, internet access, and digital teaching aids, their rural counterparts often operate without electricity, let alone computers or internet connectivity. This imbalance hinders the equitable application of digital learning and widens educational inequality (Norris, 2001).

Edo South Senatorial District, located in Edo State, is a key educational zone with a mix of rural and urban secondary schools. This diversity presents an ideal context for examining how technology affects teaching and learning across varying levels of access and support. According to Adewale and Alabi (2019), urban schools in Edo South are more likely to benefit from government and private sector investments in digital learning infrastructure, while schools in outlying areas face barriers such as poor connectivity, limited funding, and lack of trained personnel.

Furthermore, while infrastructure is a critical factor, the human element—particularly teacher readiness and attitudes—is equally vital. Research shows that even where digital tools are available, many teachers lack the confidence or pedagogical knowledge to effectively integrate technology into their lessons (Ertmer et al., 2012). Without continuous professional development and administrative support, efforts to modernize classroom practices may not yield significant outcomes.

Another issue is the lack of data-driven evaluation of existing technological initiatives in schools. Many policies and pilot programs are introduced with little follow-up research to determine their impact on learning outcomes. As a result, gaps remain between policy intentions and classroom realities. For example, while the Federal Government has launched initiatives to distribute tablets and e-resources to schools, it is unclear how these tools are being used in actual teaching and whether they are improving student engagement and academic achievement.

In light of these challenges, there is a pressing need to investigate how technology is currently influencing teaching and learning practices in specific Nigerian contexts. The choice of Edo South Senatorial District for this study is strategic, as it represents both the opportunities and limitations inherent in Nigeria’s push for educational modernization. By evaluating access to digital tools, teacher readiness, and the actual impact of technology on student learning, this study seeks to provide a comprehensive view of the situation on the ground.

Moreover, in the wake of the COVID-19 pandemic, which forced a sudden shift to online and hybrid learning globally, the importance of technological resilience in education systems has become even more apparent. This further underscores the relevance of understanding the local readiness and capacity to adopt digital learning solutions in regions like Edo South.

Therefore, this research not only responds to national and global calls for technology-enhanced education but also aims to contribute evidence-based insights that can inform policy decisions, support school improvement plans, and empower educators and learners to make the most of digital innovations. It will help clarify what works, what does not, and what needs to change in order to create a more inclusive and effective educational system in Edo South and other similar regions across Nigeria.

* 1. **Statement of the Problem**

Even though the world increasingly understands how powerful technology can be in education, many developing countries like Nigeria still struggle to use digital tools effectively in their schools. Studies have shown that using Information and Communication Technologies (ICTs) in education can help students access learning more easily, receive teaching that fits their needs, and stay more engaged in the classroom. However, these benefits are not universally experienced particularly in under-resourced or rural areas.

In Nigeria, although national policies such as the *National Policy on ICT in Education* (Federal Ministry of Education, 2019) have been developed to promote digital transformation in schools, implementation has been uneven and slow. In regions like Edo South Senatorial District, this gap is even more pronounced. Many senior secondary schools in this area lack the fundamental infrastructure needed to support technology-based teaching and learning. Issues such as unreliable electricity, limited internet connectivity, shortage of digital learning devices, and a lack of trained teachers significantly impede the integration of ICT in education (Obi & Okoro, 2020; Ojo & Abimbola, 2017).

While some previous studies have examined technology use in Nigerian schools, few have focused specifically on the unique socio-educational environment of Edo South Senatorial District a region with both urban and rural schools facing varying degrees of resource allocation and infrastructural support. Moreover, the available research does not adequately address the practical experiences of teachers and students regarding how technology is being applied in classroom instruction and how it affects student engagement and academic performance.

There is, therefore, a crucial need to investigate the current state of technological integration in teaching and learning within this specific region. Key questions remain unanswered: Are technological resources adequately available and accessible in these schools? Are teachers prepared and willing to use them effectively? Is student learning actually being enhanced, or is technology just a symbolic gesture?

This study seeks to fill this gap by focusing on three primary concerns:

* The availability and accessibility of digital tools in senior secondary schools in Edo South;
* The preparedness, attitudes, and professional capacity of teachers to implement technology-driven instruction;
* The actual impact of technology on students’ learning outcomes and classroom engagement.

By addressing these concerns, the research aims to offer practical insights that can inform educational policy and planning. The findings are expected to contribute to bridging the digital divide and guiding more equitable and effective integration of technology in Nigerian secondary education.

* 1. **Purpose of the Study**

The purpose of this study is to examine the impact of technology on teaching and learning in senior secondary schools in Edo South Senatorial District, Edo State. The specific objectives are as follows:

* To assess the extent to which technological resources are available and accessible in these schools.
* To investigate the preparedness and attitudes of teachers towards the use of technology in their teaching practices.
* To evaluate the impact of technology on student engagement and learning outcomes.
* To explore the challenges faced by schools in integrating technology into the educational process.
  1. **Research Questions and/or Hypotheses**

The following are research questions that this study seeks to answer:

* + To what extent are technological resources available and accessible in senior secondary schools in Edo South Senatorial District?
  + How prepared and what are the attitudes of teachers towards using technology in their teaching practices in these schools?
  + What impact does technology have on student engagement and learning outcomes in these schools?
  + What challenges do schools face in integrating technology into the educational process?

The study will test the following hypotheses:

* There is no significant difference in the availability and accessibility of technological resources among senior secondary schools in Edo South Senatorial District.
* There is no significant relationship between teacher preparedness/attitudes and the use of technology in teaching practices in these schools.
* There is no significant impact of technology on student engagement and learning outcomes in senior secondary schools in Edo South Senatorial District.
* There are no significant challenges faced by schools in integrating technology into the educational process.
  1. **Significance of the Study**

This study holds significant value for multiple stakeholders within the education ecosystem, particularly in the context of Edo South Senatorial District, and it may also serve as a reference for other regions grappling with similar educational challenges.

Firstly, the study will provide evidence-based insights for educational policymakers. By identifying the current state of technological integration in senior secondary schools, the research will offer practical recommendations for developing policies that promote equitable access to digital tools, especially in underserved areas. Such data-driven policymaking aligns with national efforts to enhance the quality of education and fulfill international commitments such as the United Nations Sustainable Development Goal 4 (SDG 4), which calls for inclusive and equitable quality education and lifelong learning opportunities for all.

Secondly, school administrators will benefit from a clearer understanding of the infrastructural gaps, human resource limitations, and implementation barriers related to educational technology in their institutions. This understanding can guide more efficient allocation of resources, informed decision-making, and targeted interventions that support both teachers and learners. The insights can also aid in designing school improvement plans that incorporate digital transformation as a key priority.

Thirdly, teachers stand to gain from the study's findings on their current preparedness and attitudes toward technology use in classrooms. By revealing areas of strength and gaps in competence, the study will inform the design of more effective professional development programs that build confidence and competence in ICT-based instruction. This will help educators develop new teaching methodologies that are interactive, inclusive, and aligned with 21st-century learning demands.

Students, though indirectly, are perhaps the most critical beneficiaries. Improved integration of technology in schools will enable them to access interactive, personalized, and engaging learning experiences. It can also empower them with digital literacy skills that are essential for navigating future academic, social, and professional environments. As teachers adopt more innovative instructional strategies supported by digital tools, students are likely to experience enhanced academic performance, increased motivation, and better preparation for the digital economy.

The study will also be beneficial to parents and guardians, by highlighting the essential role of technology in their children’s education. When parents understand how digital tools can enhance learning, they are more likely to support its use both at home and in school, thereby reinforcing a more holistic learning environment.

From an academic and research standpoint, this study will contribute to the expanding literature on technology-enhanced education in sub-Saharan Africa. It will serve as a foundational resource for future researchers seeking to explore related issues, such as the impact of specific technologies on student performance or comparative studies across regions. The data generated may also support interdisciplinary research that links education with technology, development studies, and sociology.

Finally, the broader societal impact of this research lies in its potential to support national development goals. A digitally literate and technologically empowered student population is more likely to contribute meaningfully to economic growth, innovation, and civic engagement. By identifying practical solutions to current challenges, the study will assist stakeholders in making strategic decisions that enhance both the quality and equity of education delivery.

In summary, this research aims not only to evaluate the status of technology in education but also to stimulate dialogue and action that promote effective, inclusive, and sustainable digital learning practices across Edo South Senatorial District and beyond.

* 1. **Scope of Study**

The study focuses on the impact of technology in teaching and learning within senior secondary schools. Specifically, it examines:

* + Availability and Accessibility of Technological Resources: This includes the presence of digital tools such as computers, tablets, internet connectivity, and educational software.
  + Teacher Preparedness and Attitudes: The study explores how prepared teachers are to integrate technology into their teaching practices and their attitudes towards using these tools in the classroom.
  + Impact on Student Engagement and Learning Outcomes: The research investigates how the use of technology affects student engagement, participation, and overall academic performance.
  + Challenges in Technology Integration: It identifies and analyzes the barriers that schools face in effectively incorporating technology into the educational process.

The study is geographically limited to the Edo South Senatorial District in Edo State, Nigeria. This area includes both urban and rural schools, providing a diverse context for examining the differences in technology adoption and its impact on education. The findings will be specific to this region, but they may also offer insights applicable to other similar regions within Nigeria and potentially in other developing countries facing comparable educational challenges.

* 1. **Operational Definition of Terms**
* Technology Integration

The process of incorporating digital tools and resources, such as computers, internet, and educational software, into the teaching and learning environment to enhance educational outcomes.

* Learning Outcomes

The measurable academic achievements of students, including knowledge, skills, and competencies, that result from the educational process. This study focuses on how technology influences these outcomes (Bloom, 1956).

* Educational Technology

Refers to the use of digital tools and resources, such as online platforms, multimedia content, and interactive software, to support and enhance the teaching and learning process (Reiser & Dempsey, 2017).

* Information and Communication Technology (ICT)

A broad term encompassing technologies that provide access to information and communication, including the internet, wireless networks, cell phones, and other communication mediums.

**CHAPTER TWO**

**LITERATURE REVIEWS**

This chapter deals with the review of literature considered important to this study. The literature review is discussed under the following sub-headings:

**2.1 Conceptual Framework**

The conceptual framework serves as a structured approach to for understanding the impact of technology in education, particularly within senior secondary schools in Edo South Senatorial District. This framework integrates several key components:

**Technological Resources and Infrastructure**

The availability, accessibility, and quality of technological resources and infrastructure form the foundational basis for technology integration in education. These resources include hardware tools (such as computers, projectors, and tablets), connectivity infrastructure (internet access, power supply), and software applications (educational platforms, digital learning environments, and multimedia resources). Literature consistently emphasizes that the presence and quality of these resources significantly determine the success or failure of technology-enhanced learning environments (Tinio, 2002).

Warschauer (2004) highlights that disparities in access to digital infrastructure often reflect broader socio-economic inequalities. According to his analysis, students from marginalized or under-resourced communities are less likely to have access to modern technological tools, thereby deepening the educational divide. This issue is particularly evident in countries like Nigeria, where urban schools often have better access to ICT resources compared to rural or semi-urban schools.

Similarly, Ojo and Abimbola (2017) found that infrastructure plays a critical role in determining the extent to which digital tools are utilized in schools. Their study revealed that schools with better facilities consistent electricity, updated computer labs, and internet connectivity reported higher levels of technology integration and student engagement. This reinforces the notion that infrastructure is not merely a supportive element but a core component of any effective technology integration strategy.

Reiser and Dempsey (2017) added that infrastructural readiness also involves having the appropriate technical support systems in place. Schools that invest in ICT personnel, routine maintenance, and technical assistance for teachers tend to have smoother and more consistent technology usage in classrooms. Without such systems, even well-funded initiatives may falter due to practical implementation problems.

According to Norris (2001), bridging the digital divide involves more than providing physical access; it also includes developing the digital capacity of schools and communities to support learning. Access without support often results in underuse or ineffective use of technologies. Hence, the effectiveness of technological infrastructure depends not only on the availability of devices and internet but also on the presence of supportive institutional systems.

More recently, the Edo State Ministry of Education (2023) emphasized in their Annual School Census Report that over 60% of public secondary schools in the state lack adequate ICT facilities. The report noted significant disparities between private and public institutions in terms of access to functional computer laboratories, internet bandwidth, and power reliability. These infrastructural gaps directly influence the capacity of teachers and students to participate in digital learning initiatives.

Furthermore, Adeoye and Adelakun (2021) argue that the presence of functional infrastructure not only improves lesson delivery but also helps teachers to demonstrate practical applications of knowledge. A school with reliable internet access, for example, can support live webinars, virtual excursions, and real-time research. The absence of these tools widens the digital divide between public and private schools.

Taken together, the reviewed literature consistently affirms the centrality of infrastructure to the success of ICT-based education. What emerges across these studies is a shared understanding that technology cannot independently improve learning outcomes unless it is supported by a well-equipped, accessible, and sustainable infrastructural environment. The literature also reveals a concerning pattern while infrastructure is often included in policy rhetoric, its actual implementation remains insufficient, especially in public schools across developing nations.

An important insight is the dynamic relationship between infrastructure and other elements of ICT adoption such as teacher training, student engagement, and curriculum design. For instance, Reiser and Dempsey (2017) emphasize the value of technical support systems, which aligns with Ojo and Abimbola's (2017) observation that equipment alone is not enough without consistent power supply and maintenance. These connections underscore the idea that technological infrastructure is not a stand-alone component but part of a broader ecosystem of digital readiness.

In the context of Edo South Senatorial District, the synthesis of findings suggests that without urgent investment in infrastructure, efforts to promote digital literacy and classroom technology use will remain largely ineffective. Schools with poor ICT infrastructure are unlikely to attract or retain skilled teachers, and students in such environments will continue to be disadvantaged in comparison to their peers in better-resourced institutions. Hence, addressing infrastructural limitations is not just a technical requirement but a social equity imperative.

In conclusion, the literature highlights that technological infrastructure is central to the successful integration of ICT in education. Schools in developing regions, particularly in Nigeria, face persistent infrastructural barriers that undermine the benefits of digital learning. Therefore, any educational reform aimed at leveraging technology must prioritize investments in infrastructure, ensure equitable distribution, and incorporate continuous support mechanisms to enable meaningful access and use.

**Teacher Preparedness and Professional Development**

Teacher preparedness refers to the extent to which teachers possess the knowledge, skills, and attitudes necessary to integrate technology into teaching. The preparedness of teachers and their attitudes toward technology are pivotal in determining the successful integration of digital tools into educational settings. Technological infrastructure alone cannot transform education if teachers lack the skills, confidence, or motivation to use it. Ertmer et al. (2012) emphasize that teachers’ beliefs substantially influence how effectively technology is adopted in classrooms.

Bandura’s (1977) theory of self-efficacy provides a useful lens for understanding teacher behavior. When teachers believe in their ability to effectively use technology, they are more likely to experiment with new tools and integrate them meaningfully into instruction. Conversely, low self-efficacy, even in the presence of available resources, often leads to avoidance or minimal use of ICT in classrooms.

In a study by Emenike and Osarenren (2018), many Nigerian teachers reported that they felt unprepared to integrate ICT into their teaching due to a lack of formal training. The study also found that access to professional development significantly influenced the teachers’ confidence and willingness to adopt technology. Teachers who received consistent training were more likely to demonstrate innovative uses of ICT in lesson planning and delivery.

Adewale and Alabi (2019) emphasized that continuous teacher training must be a cornerstone of any technology integration strategy. Their study revealed that without structured and practical training, most teachers default to traditional chalk-and-board methods, even when digital resources are available. This finding supports the argument that professional development should be ongoing, context-specific, and hands-on.

Koehler and Mishra’s (2009) TPACK framework highlights that teachers need a mix of technology skills, teaching methods, and subject knowledge to use digital tools effectively. Simply knowing how to operate a computer isn’t enough—they also need to understand how to use technology to support what they are teaching. In Edo South, the Ministry of Education organizes training workshops, but many teachers say these sessions are either too brief or focus too much on theory rather than practical use.

Davis’s (1989) Technology Acceptance Model (TAM) reinforces these findings. According to the model, users' acceptance of technology is determined by their perceptions of its usefulness and ease of use. For teachers, this means that if they believe technology will enhance student learning and that it is not too complex to use, they are more likely to adopt it. Therefore, effective teacher preparation must not only develop digital competencies but also reshape attitudes.

In addition, institutional culture and leadership support play a significant role in shaping teacher attitudes. Studies have shown that schools with collaborative cultures and supportive administrators tend to have higher rates of ICT adoption (Koehler & Mishra, 2009). When teachers feel encouraged and supported, their confidence grows, and resistance to change diminishes.

Ajayi (2017) looked into the difficulties rural school teachers face when trying to use technology. He discovered that the main challenges included the absence of support from fellow teachers, little help from school leaders, and not having enough time. To be effective, teacher training needs to be ongoing, hands-on, and flexible enough to match different skill levels.

School environment also affects how teachers grow. According to Ojo and Abimbola (2017), schools where teachers work together as a team are more likely to successfully use and keep using digital teaching methods. Support from colleagues and school leaders can encourage teachers who are unsure about technology to try out new tools and techniques.

The literature clearly demonstrates that teacher preparedness and attitudes are both psychological and practical in nature. A common thread across studies is the importance of training not just once, but continuously to ensure that educators stay abreast of new technologies and pedagogical strategies. While resources and policy matter, the personal beliefs and professional readiness of teachers often determine the real-world impact of technology in classrooms.

This component of the conceptual framework also interacts significantly with other factors like infrastructure and student engagement. For example, even in schools where infrastructure is adequate, the lack of trained and motivated teachers often results in poor utilization of digital tools. This emphasizes that technology integration is a human-centered process that depends heavily on teachers’ capacity and mindset.

In the context of Edo South Senatorial District, where many teachers may not have had consistent access to professional development, the implications are profound. Building a digitally empowered teaching workforce is essential for any meaningful advancement in educational outcomes. Training programs should not only address technical skills but also foster positive attitudes by demonstrating tangible benefits in classroom effectiveness.

**Student Engagement and Learning Outcomes**

Student engagement refers to the level of attention, interest, curiosity, and motivation students show in the learning process. When students are actively engaged, they are more likely to understand and retain content. Student engagement and academic achievement are widely acknowledged as key indicators of the success of educational interventions, including the integration of technology in classrooms. Numerous studies emphasize that when digital tools are meaningfully applied, they can significantly enhance student motivation, interactivity, and comprehension (Schlechty, 2011).

Engaging students requires creating meaningful learning experiences. Digital games, quizzes, simulations, and virtual reality environments encourage active rather than passive learning. Adesanya and Idowu (2016) observed that students taught with interactive videos and educational apps performed better and were more attentive. Their study in Lagos State showed a 30% improvement in test scores after tech-based instruction.

According to Kirkwood and Price (2014), the success of technology in driving engagement depends on how it's used. Poorly designed tools or inconsistent use can reduce interest and even cause distraction. Thus, student-centered technology must be intuitive, visually appealing, and curriculum-aligned.

Furthermore, Musa and Ibrahim (2020) found that students are more engaged when they feel ownership of their learning. Platforms like Google Classroom and Moodle allow students to review materials, submit assignments, and get feedback at their own pace. This fosters autonomy and deeper learning. In schools where such systems are available, students reported greater satisfaction and lower dropout intentions.

According to Adewale and Alabi (2019), technology offers students diverse avenues for learning such as multimedia content, simulations, and interactive apps that make learning more personalized and engaging. Their study found that students who regularly interacted with digital learning platforms performed better in standardized assessments than those taught using only traditional methods.

Obi and Okoro (2020) similarly observed that student-centered technologies, such as educational games and collaborative tools, foster improved classroom participation and higher levels of concentration. In their research in Edo South Senatorial District, they found a noticeable improvement in students’ involvement during lessons that incorporated technology, particularly in science and mathematics.

Moreover, a study by Adesanya and Idowu (2016) highlighted that technology can bridge different learning styles, supporting auditory, visual, and kinesthetic learners more effectively. This diversity in content delivery methods helps students grasp complex concepts and retain information longer.

Kirkwood and Price (2014) stressed that the nature of student engagement with technology depends on the quality of its integration. When technology is embedded thoughtfully into the curriculum, it encourages active learning, peer collaboration, and independent exploration. However, superficial or inconsistent use may yield limited results or even disengagement.

From a theoretical standpoint, constructivist learning theories support the idea that learners construct their own knowledge through interaction with tools and their environment. Technology, when used to support discovery learning, project-based tasks, and formative assessments, aligns with this theory and leads to deeper engagement (Jonassen, 1999).

While the reviewed literature agrees that technology holds substantial promise for increasing student engagement and achievement, the impact is not automatic. Rather, it depends on how and when the technology is used, and whether both students and teachers are adequately equipped to interact with it. Studies by Obi and Okoro (2020) and Adewale and Alabi (2019) affirm the positive outcomes associated with purposeful use, while Kirkwood and Price (2014) caution against assuming that the presence of digital tools alone will improve learning.

Another consistent finding is that student engagement increases when technology is used to create active, not passive, learning experiences. Interactive simulations, quizzes, and collaborative platforms generate excitement and agency among students, especially when aligned with curriculum objectives. In Edo South Senatorial District, such approaches could potentially help close achievement gaps in key subject areas.

Overall, the literature suggests that technology can significantly enhance learning outcomes if implemented with pedagogical intent, supported by teacher training, and guided by student needs. For this study, understanding the nature of student interaction with technology will be crucial in evaluating its overall impact on educational effectiveness.

**Equity and Access to Technology**

Equity and access to educational technology remain persistent challenges in both global and local contexts. Equity in education implies that all learners, regardless of socioeconomic status, geographical location, or disability, have access to quality learning resources and opportunities. However, research has repeatedly shown that unequal access to technology has led to a widening digital gap, especially in developing countries and as Warschauer (2004) emphasizes, equity goes beyond device distribution, it involves ensuring that all students can use the tools meaningfully.

Norris (2001) posits that the digital divide is not merely about physical access to hardware or internet connectivity, but about meaningful access which includes affordability, digital literacy, and the ability to use digital tools effectively for educational advancement. In his global analysis, he found that socioeconomically disadvantaged students are not only less likely to have access to computers and internet but also receive limited guidance on how to use them productively.

In the Nigerian context, Tinio (2002) underscores that digital equity is further undermined by regional disparities, inconsistent funding, and infrastructural limitations. Urban schools are generally better equipped, while schools in rural or semi-urban settings often lack the most basic technological infrastructure. This unequal distribution directly affects students’ learning opportunities and future competitiveness in a digital economy.

Obi and Okoro (2020), in their study of Edo South Senatorial District, found stark contrasts in technology access between public and private schools. While some private institutions had access to smartboards, internet-enabled classrooms, and project-based digital learning, most public schools were limited to a few outdated desktop computers, often shared by many students. This not only restricts learning but perpetuates educational inequalities.

Reiser and Dempsey (2017) add that access must also be inclusive of students with disabilities. Their work highlights the importance of adaptive technologies such as screen readers and voice recognition software in ensuring that all learners can benefit from digital resources. However, such inclusive technologies are rarely prioritized in low-resource settings.

Emenike and Osarenren (2018) emphasize that fair access to technology also relies on making sure educational content fits the local culture and language. If learning materials don’t reflect students’ real-life situations or are not in a language they understand, the technology might not be useful or fully used. They also suggest that government policies should focus more on supporting disadvantaged communities when rolling out digital education. Programs like the Universal Service Provision Fund (USPF) and other grants can help provide resources to schools that lack proper funding.

The literature reviewed reveals that equitable access to educational technology is multifaceted. It extends beyond the mere presence of devices to include training, support systems, localized content, and affordability. There is also a need to move from access to meaningful use. Warschauer (2004) and Norris (2001) advocate that policymakers must view access as a layered concept physical, digital, educational, and cultural.

Community involvement enhances equity. Schools that engage local leaders, parents, and alumni in fundraising or donations tend to bridge the gap faster. Equitable access requires systemic commitment, community support, and continuous evaluation to ensure that no student is left behind in the digital learning revolution.

In the case of Edo South Senatorial District, the synthesis suggests that although some schools are progressing with technology integration, many are still far behind. These gaps are compounded by socioeconomic inequalities, lack of government intervention, and inconsistent community support. Without targeted investments and inclusive policies, technology may end up amplifying rather than narrowing the education gap.

Thus, any strategy to enhance digital learning in the region must prioritize equitable access. This includes not only expanding ICT infrastructure but also ensuring that all students and teachers regardless of background have the knowledge, tools, and support needed to use it effectively.

The conceptual framework for this study highlights the interconnected nature of various factors that influence the successful integration of technology in education. One of the key elements is infrastructure, which includes both physical resources like computers and internet access, and soft infrastructure such as technical support and digital literacy programs. Without a strong infrastructure, other efforts to integrate technology may falter. For example, teachers may be well-trained and eager to use digital tools in their classrooms, but if the internet is unreliable or computers are outdated, their efforts will be hampered.

The interplay between these components is critical. For instance, the presence of technological resources alone does not guarantee improved educational outcomes; it must be complemented by teacher preparedness and a conducive learning environment. This framework underscores the multifaceted nature of technology integration in education, where each element must align to maximize benefits.

**2.2 Theoretical Framework**

This study is guided by a combination of established educational and behavioral theories that explain how technology adoption and integration affect teaching and learning outcomes. These theories provide a conceptual basis for understanding the variables explored in this research and serve to connect the study to existing knowledge in the field.

Bandura's Social Learning Theory emphasizes that learning occurs in a social context and is facilitated through observation, imitation, and modeling. In technology-supported classrooms, students are not limited to learning from teachers alone. They observe peers using digital tools, engage in collaborative activities via platforms such as Google Classroom or Zoom, and mimic problem-solving techniques demonstrated through videos and simulations. Technology thus serves as both a medium for social interaction and a tool for observational learning.

In the Nigerian classroom context, especially in schools within Edo South Senatorial District, peer modeling and observational learning are crucial in encouraging students to adopt positive learning behaviors. For example, students unfamiliar with educational apps or digital platforms are more likely to explore these resources after seeing their peers successfully engage with them. Therefore, the application of Social Learning Theory explains how technology in the classroom enhances social and cognitive development.

The Technology Acceptance Model (TAM) focuses on two major constructs—perceived usefulness and perceived ease of use—that influence individuals' intention to use a new technology. Teachers are more inclined to incorporate technology into their teaching if they perceive that it will make their work more effective or more efficient. Conversely, if a digital tool is seen as too complicated or irrelevant to the curriculum, resistance to its use increases.

In the context of this study, TAM helps to frame the investigation into teachers’ preparedness and attitudes. For example, even in schools with adequate ICT resources, technology integration might remain low due to negative perceptions or a lack of training. Understanding these attitudinal barriers is crucial in designing effective training programs that focus not only on technical skills but also on demonstrating educational value.

Constructivist theorists like Jean Piaget and Lev Vygotsky argue that learners actively construct their own understanding through experiences, inquiry, and problem-solving. When technology is integrated into the classroom in ways that promote hands-on learning, students are better able to engage in discovery-based learning processes. Tools such as educational games, simulations, and interactive e-textbooks encourage learners to explore, ask questions, and construct their own knowledge.

Vygotsky’s concept of the Zone of Proximal Development (ZPD) also fits well with digital learning environments. For instance, scaffolded digital resources like video tutorials or step-by-step coding platforms can support learners in mastering concepts that might be difficult with traditional instruction alone. In the context of this study, constructivist theory helps explain how technology facilitates differentiated learning experiences and enhances student engagement.

The TPACK framework represents the intersection of three primary forms of teacher knowledge: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). The model asserts that effective integration of technology in education does not depend solely on knowing how to use a tool but understanding how, when, and why it should be used in conjunction with content and pedagogy.

TPACK is especially relevant in the Nigerian educational landscape, where teachers often receive fragmented or insufficient ICT training. A teacher might know how to operate a digital whiteboard but not how to use it to teach chemistry effectively. The TPACK framework underscores the need for integrated professional development programs that simultaneously address content mastery, pedagogical techniques, and digital fluency.

Rogers’ Diffusion of Innovations Theory outlines how new ideas and technologies spread within a social system. It identifies key elements that influence adoption: relative advantage, compatibility, complexity, trialability, and observability. In the case of schools, factors such as school leadership, peer influence, and visibility of successful outcomes play major roles in how quickly and effectively technology is adopted.

This theory provides a valuable framework for interpreting the differences in technology use between public and private schools, or between urban and rural areas. Schools that demonstrate clear benefits of technology integration (e.g., improved student performance or administrative efficiency) are more likely to influence others to follow suit. Understanding these diffusion patterns helps stakeholders develop better strategies for encouraging widespread adoption of educational technology.

Sweller’s Cognitive Load Theory (1988) highlights the importance of designing instructional content that does not overwhelm the learner’s working memory. If too much information is presented at once, especially in a confusing or disorganized way, students may struggle to learn. Technology can help manage this by breaking content into smaller parts, using visual and audio aids, and allowing students to learn at their own pace.

For example, a video lesson that explains a science topic with diagrams and animations can reduce cognitive strain compared to a long-written passage. In this way, Cognitive Load Theory supports the idea that when technology is used wisely, it makes learning more efficient and less overwhelming.

The SAMR model describes four levels of technology use in education: Substitution, Augmentation, Modification, and Redefinition. At the Substitution level, technology simply replaces traditional tools (e.g., typing instead of handwriting). At Redefinition, however, technology enables new tasks that were previously impossible (e.g., students collaborating with peers from other countries via virtual exchanges).

This model helps assess how deeply technology is integrated in schools. It encourages educators to aim for higher levels of transformation rather than just using tech for convenience. In Edo South, the SAMR model can be used to evaluate how schools use digital tools not just whether they are used, but how meaningfully.

Kolb’s Experiential Learning Theory argues that real learning happens through experience by doing, reflecting, thinking, and then applying. Technology supports this cycle by offering simulations, virtual labs, interactive experiments, and project-based learning.

In schools with limited physical resources, digital labs or software can give students virtual hands-on experiences. This theory reinforces how technology brings learning to life, making lessons more practical and connected to real-world contexts.

B. F. Skinner’s Behaviorist Theory (1953), though developed many years ago, still applies in modern digital classrooms. It plays a role in systems that use feedback, rewards, and repeated practice to guide learning. Today, many learning platforms and educational apps apply these ideas by using rewards like badges, points, or progress bars to encourage students and keep them motivated.

Lave and Wenger’s Situated Learning Theory emphasizes that students grasp knowledge more effectively when they are involved in meaningful, real-life activities. In today’s digital era, technology makes this possible by simulating authentic learning environments. For example, virtual reality (VR) can transport learners to historical landmarks, or allow them to carry out science experiments in a virtual lab. These immersive experiences give students a richer, more practical understanding of what they’re studying bridging the gap between theory and real-world application.

Deci and Ryan’s Self-Determination Theory highlights the importance of three core elements in learning: autonomy, competence, and connection. Technology supports these drivers by allowing students to choose tools and platforms that align with their interests, and by providing timely feedback that builds their confidence. For instance, apps that let students work at their own pace or explore topics they’re passionate about can significantly increase intrinsic motivation. This theory underpins the growing trend toward personalized digital learning paths, where students feel empowered, capable, and more engaged.

Richard Mayer’s Cognitive Theory of Multimedia Learning argues that students learn best when information is presented through both visuals and words, rather than text alone. In classrooms where learners might struggle with reading or where multiple languages are spoken, this theory becomes especially useful. Educational videos, animated lessons, and interactive infographics help simplify complex concepts and improve retention. By aligning digital content with how the brain processes information, this approach makes learning more accessible and memorable for all students.

Connectivism is a modern learning theory for the digital age. It says that learning happens through networks connections with people, information sources, and digital tools. This is especially true today, where students learn from online forums, social media, search engines, and digital communities.

Connectivism shows why it’s important for students to not just memorize facts but know how to find, filter, and use information. In technology-rich environments, this theory explains the shift from teacher-centered to learner-driven education.

Though older, behaviorist theory still applies to many modern learning tools. It’s based on the idea that learning is shaped by reinforcement rewards or punishments. Many educational apps and online platforms use this idea by giving instant feedback, badges, or scores to motivate students.

In Nigerian schools, especially in settings where student motivation is a challenge, gamification tools grounded in behaviorist principles can keep learners engaged and progressing.

Each of these theories contributes to a deeper understanding of how and why technology influences education. Some, like Constructivism and Experiential Learning, focus on how students learn. Others, like TAM and Diffusion of Innovations, focus on how teachers and schools adopt new tools. TPACK helps bridge the gap between knowledge and classroom practice, while models like SAMR and Connectivism show how technology changes what learning looks like.

In this study, these theories provide both the justification for the research problem and a framework for interpreting findings. They emphasize that meaningful technology use depends on infrastructure, training, beliefs, student needs, and innovation. This theoretical foundation ensures that the research is anchored in well-established knowledge and can contribute to both practice and further inquiry.

**2.3 Empirical Studies**

Several studies both local and international have been conducted to examine the role of technology in enhancing teaching and learning across different educational levels. This section presents a synthesis of empirical evidence gathered from relevant scholarly works, particularly those focused on Nigeria and similar educational settings, to establish what is already known, where gaps exist, and how this present study contributes to the discourse.

In a seminal study conducted by Adewale and Alabi (2019), the researchers evaluated the impact of technology integration on students’ academic performance in Nigerian secondary schools. The study utilized a sample of 300 students selected through stratified random sampling across 10 schools. Using both test scores and structured questionnaires, the researchers found that students who regularly accessed digital learning tools especially educational software and the internet demonstrated superior academic performance, particularly in science and mathematics. Their findings underscore the importance of access to technology and its correlation with improved cognitive engagement and academic achievement. Notably, the study stressed that technology alone is not enough; it must be accompanied by teacher supervision and curriculum alignment for effective outcomes.

Another empirical study by Obi and Okoro (2020) focused on barriers to technology integration in Nigerian secondary schools. Their mixed-methods approach combined interviews with school administrators and surveys distributed to over 250 teachers and students across both public and private institutions. The study revealed stark disparities in access to ICT infrastructure. While private schools had functional computer labs and stable electricity, most public schools had outdated or non-functional systems, if any. The researchers emphasized that the lack of maintenance culture and insufficient government funding were primary contributors to this divide. Importantly, the study found that even where basic technology existed, lack of teacher training led to underutilization, highlighting a dual-layered barrier: access and competence. They recommended an increased budgetary allocation for ICT and regular teacher development initiatives.

A study by Emenike and Osarenren (2018) sought to assess the role of professional development in enhancing the use of technology in Nigerian classrooms. They conducted a quasi-experimental study involving 120 teachers who participated in a structured ICT training program over six weeks. Pre- and post-tests showed a significant improvement in the teachers’ confidence and competence levels in using digital tools. Additionally, classroom observations revealed that trained teachers were more likely to incorporate multimedia and online content into their lessons. The study concluded that ongoing, context-specific training is a critical driver of effective technology use and should be institutionalized as part of teacher development programs. It also stressed the importance of mentorship and follow-up support post-training.

Further evidence is provided by Ojo and Abimbola (2017), who studied the relationship between infrastructural investment and technology usage in secondary schools across Southern Nigeria. The study involved surveys from 450 respondents, including students, teachers, and IT personnel. Their findings highlighted a strong positive relationship between the quality of infrastructure (internet connectivity, functional hardware, and power supply) and the frequency of technology use in classrooms. They also noted that in schools where principals actively supported digital adoption by encouraging ICT clubs or assigning tech-savvy teachers to lead training there was significantly higher use of educational technology tools. This finding supports the argument that school leadership is a key determinant in successful integration.

In a more focused study on student engagement, Adesanya and Idowu (2016) examined the effect of technology-enhanced learning on science students in Lagos State. Using a comparative design, the researchers observed two groups: one taught using conventional methods and the other using a technology-enriched approach involving simulations, interactive videos, and mobile learning apps. The tech-enhanced group demonstrated higher motivation, improved test scores, and better retention of content. The study emphasized the role of interactive technologies in fostering curiosity and independent learning, especially in subjects perceived as difficult. Additionally, students expressed more enthusiasm about learning when digital tools were integrated into the teaching process.

An important empirical study by Ogundele and Olaleye (2021) examined the impact of mobile learning on academic achievement among secondary school students in Oyo State. The researchers used a sample of 200 students divided into control and experimental groups. The experimental group used mobile apps such as Google Classroom and Quizlet for a period of 6 weeks. At the end of the study, the students in the mobile learning group showed significant improvement in English Language and Mathematics compared to the control group. The study concluded that mobile devices can serve as powerful educational tools when guided appropriately.

Equally significant is the work of Ahmed and Adebayo (2020), who explored how socio-economic background influences students’ access and use of digital resources in Northern Nigeria. They used structured interviews and surveys involving 400 students across low-income and high-income communities. Their analysis showed that students from wealthier backgrounds had more access to home internet and personal devices, while those from poorer communities relied entirely on school facilities. The study underlined the urgent need for equity-driven policies that bridge the digital divide.

In a different but related context, Musa and Ibrahim (2020) investigated the attitudes of teachers towards integrating technology in classrooms in the Federal Capital Territory, Abuja. Their study, which included responses from 150 teachers, found that most teachers acknowledged the usefulness of technology but expressed hesitation due to lack of training and fear of failure. The findings suggest that while attitudinal readiness exists, structural barriers need to be addressed through systemic support and confidence-building workshops.

Another valuable study by Chukwu and Anozie (2022) focused on the relationship between ICT policy implementation and classroom practices in Enugu State. Through document analysis and interviews with policymakers and school administrators, they found a significant gap between national ICT policy intentions and actual practices in schools. Schools lacked clear frameworks, and teachers often were unaware of existing policies. The study suggested a stronger alignment between policy and practice through stakeholder engagement and periodic evaluation.

The study by Umeh and Eze (2021) explored how gender affects the use of technology among secondary school students in Anambra State. The study revealed that male students were more likely to experiment with new technologies, while female students showed higher interest in using tech tools for collaborative learning. These gender differences highlighted the need for inclusive training approaches that cater to diverse preferences and encourage participation across groups.

Another important empirical investigation was carried out by Okonkwo and Udo (2018), who examined the relationship between technology use and teacher productivity in South-East Nigeria. The researchers administered structured questionnaires to 180 secondary school teachers. The study revealed a strong positive correlation between ICT use and various dimensions of productivity, including timely lesson planning, more effective student feedback, and overall job satisfaction. Teachers who regularly used digital tools such as PowerPoint, grading software, and lesson planners reported feeling more in control of their workload. This study underscores the broader benefits of technology for teacher efficiency, not just student outcomes.

In a rural-focused study, Ibrahim and Bello (2019) explored the challenges facing e-learning implementation in underserved areas of Northern Nigeria. Using qualitative interviews with 50 teachers and administrators, the study uncovered recurring issues such as lack of electricity, inadequate digital literacy, poor infrastructure, and limited internet access. Many participants expressed frustration with inconsistent government support and a lack of technical personnel to manage school ICT resources. These findings echo challenges also observed in parts of Edo South Senatorial District, reaffirming the need for systemic solutions beyond hardware provision.

Nkwocha and Ekeh (2020) conducted a quasi-experimental study on the effectiveness of interactive whiteboards on student retention in senior secondary schools in Imo State. Their research involved 250 students, divided into experimental and control groups. The students exposed to interactive whiteboards consistently outperformed their peers in both short-term tests and long-term retention assessments. The study concluded that interactive visual tools help students retain complex information better than traditional teaching aids. The implications of this study suggest that investment in smart classrooms can yield measurable improvements in student learning.

In a broader look at student preparedness, Fatoba and Adeleke (2022) assessed digital readiness among secondary school students in Lagos State. Their sample included 500 students from urban, suburban, and rural schools. The findings showed that students in urban schools had higher digital literacy and greater access to personal devices and the internet. Students from rural schools, on the other hand, relied heavily on school-owned devices, which were often shared and outdated. This study reinforces the digital divide along socioeconomic and geographic lines, aligning with findings from other regions and emphasizing the need for equity-focused interventions.

Finally, Afolabi et al. (2023) evaluated the effect of Learning Management Systems (LMS) like Moodle on assignment completion and student satisfaction. Conducted in three private secondary schools over one academic term, the study showed that assignment submission rates increased from 58% to 88% after the introduction of LMS tools. Furthermore, students reported greater clarity in task expectations, improved feedback from teachers, and enhanced engagement with course content. The study demonstrates the administrative and pedagogical potential of digital platforms to improve learning outcomes.

Although these studies offer valuable information, many tend to concentrate on just one area such as infrastructure, teacher training, or access to technology, or they present broad conclusions without focusing on less-studied areas like Edo South Senatorial District. This shows a clear need for more focused and detailed research that looks at all key factors access, readiness, engagement, and outcomes together. This current study aims to fill that gap by combining all these aspects into one comprehensive investigation, based on real experiences shared by students, teachers, and school administrators in the region.

In summary, the reviewed empirical studies consistently affirm that technology holds substantial potential to transform teaching and learning. However, its actual impact depends on a combination of factors: availability of infrastructure, teacher preparedness, institutional support, and student readiness. These studies not only validate the relevance of the current research but also highlight the urgent need for targeted interventions in resource-constrained environments like those found in parts of Edo South.

**2.4 Appraisal of Reviewed Literature**

The review of the existing literature on technology in education has revealed many important insights that help explain the current situation in Nigerian secondary schools, especially in Edo South Senatorial District. By examining both conceptual discussions and real-world research findings (empirical studies), this appraisal helps identify what we already know and what areas still need to be explored more deeply. It also explains how this current study will help fill those gaps.

From the conceptual studies, it is clear that the successful use of technology in education does not rely on one single factor. Instead, it depends on a group of closely related elements availability of technological resources and infrastructure, how well teachers are trained and prepared, how engaged students are, and whether there is equal access for all learners. Scholars like Warschauer (2004), Tinio (2002), and Obi & Okoro (2020) have emphasized that without basic infrastructure like electricity, internet, and computers, teachers and students cannot make use of even the best digital tools. This shows that infrastructure is not just one aspect of integration it is the foundation for all other efforts.

In terms of teacher preparedness and training, the literature reviewed stresses the need for continuous professional development. Ertmer et al. (2012) and Emenike & Osarenren (2018) have pointed out that many teachers either lack digital skills or are unsure about how to use technology effectively in the classroom. Some teachers fear making mistakes or feel that digital tools are too complex to use. This is why theories like TPACK (Koehler & Mishra, 2009) and TAM (Davis, 1989) are so important—they help explain that technology adoption depends heavily on how useful and easy teachers believe the tools are. Simply giving teachers devices is not enough. They need practical training and ongoing support.

The reviewed studies also highlight how technology can improve student learning and engagement, especially when used in interactive ways. Studies like those by Adesanya & Idowu (2016) and Kolb (1984) show that when students are exposed to digital games, simulations, and learning platforms, they tend to participate more, understand better, and enjoy the learning process. However, scholars like Kirkwood and Price (2014) warn that technology should not be used just for the sake of it poorly planned use can even reduce engagement. So, it's not about whether technology is used, but how it is used that matters most.

Another major theme that stands out is the issue of equity. Even though some schools, especially private or urban ones, are making good use of digital tools, others are being left behind due to lack of access. This digital divide is not just about having a computer. It includes internet access, learning materials, digital literacy, and language barriers. Researchers like Norris (2001), Obi & Okoro (2020), and Fatoba & Adeleke (2022) all point out that students from poor or rural backgrounds are at a disadvantage when it comes to using technology. This is a major concern because it widens educational inequalities and limits future opportunities for affected students.

When we examine the empirical studies, it becomes clear that while many Nigerian researchers have tried to assess the use of technology in schools, a lot of the findings are still general in nature. Many studies (like those by Adewale & Alabi, 2019 and Ojo & Abimbola, 2017) give a national or regional picture, but there is limited work focusing specifically on Edo South Senatorial District. Yet, we know that this region includes a mix of urban and rural areas, government and private schools, and diverse socio-economic communities. This makes it important to understand local realities rather than assuming that findings from Lagos or Abuja also apply in Benin City or Uhumwode.

Another limitation in the literature is that most studies only collect data over a short time (often one school term or less). Few studies look at the long-term effects of using technology in teaching and learning. For instance, how does technology use affect students’ learning progress over the course of an academic year? What happens to student motivation, teacher practice, or school policies after one or two years of continuous use? These are questions that remain unanswered.

Additionally, there is a lack of studies that directly capture the voices of students. While many researchers ask teachers and school heads for their views, fewer studies collect detailed information from the students themselves. But students are the ones who use these tools in learning, and their views what works for them, what challenges they face are just as important. Studies like Umeh & Eze (2021) and Afolabi et al. (2023) show that involving students can reveal insights that teachers or administrators may not notice.

In summary, the reviewed literature gives strong support for the idea that technology, when properly implemented, can improve teaching and learning. It helps teachers become more productive, allows students to participate actively in learning, and offers new ways to deliver and assess content. But the literature also shows that challenges remain, particularly in terms of infrastructure, teacher training, equitable access, and student-centered evaluation. There is also a need to focus more on local studies, longer-term tracking, and inclusion of student voices.

This current study is important because it responds directly to these gaps. By focusing on senior secondary schools in Edo South Senatorial District, it provides much-needed localized data. It also collects information from students, teachers, and administrators—offering a 360-degree view of the challenges and opportunities of technology integration. By doing so, it not only adds to academic knowledge but also provides practical guidance for policymakers, school leaders, and educators who want to use technology to improve learning outcomes.

**CHAPTER THREE**

**METHODOLOGY**

In this chapter, the processes and procedures that were followed in carrying out the study are discussed under the following sub-headings:

* 1. Research Design
  2. Population of the Study
  3. Sample and Sampling Techniques
  4. Instrument for Data Collection
  5. Validity of the Instrument
  6. Reliability of the Instrument
  7. Procedure for Data Collection
  8. Method of Data Analysis

**3.1 Research Design**

This study uses a descriptive survey design, which is a good method for finding out how technology is currently used for teaching and learning in senior secondary schools in Edo South Senatorial District. As Creswell explains, survey designs work well when you need to gather information from many people to understand the bigger picture. This approach helps the researcher collect details about how teachers and students use technology, what they think about it, and how it affects learning. It also makes it easier to gather numbers-based (quantitative) data in an organized way and spot patterns or trends.

This design is particularly useful in educational research, where studying behaviors, opinions, and attitudes without manipulating variables is necessary. Since this study aims to assess the impact of technology on teaching and learning, a descriptive approach ensures the collection of empirical data from multiple respondents within the school system.

**3.2 Population of the Study**

The population of this study consists of all senior secondary school students and teachers in public and private secondary schools in Edo South Senatorial District. The district includes various urban and rural schools, making it essential to account for differences in technological access across different socio-economic regions. The total population is estimated at 50,000 students and 3,000 teachers from approximately 200 secondary schools across the region (Edo State Ministry of Education, 2023).

The population is diverse, consisting of students from different backgrounds and schools with varying levels of technological infrastructure. This diversity makes the study valuable in understanding how socio-economic and geographical factors influence the adoption of technology in education.

**3.3 Sample and Sampling Techniques**

A stratified random sampling technique will be. A total of 100 participants (80 students and 20 teachers) were selected from secondary schools. To establish the appropriate sample size, the formula proposed by Yamane (1967, p. 22) was applied, ensuring a 95% confidence level. Stratified sampling was chosen because it allows for more accurate representation of various subgroups within the population, which is critical given the disparities in access to technology between urban and rural schools (Babbie, 2010).

Stratified sampling ensures that schools with different levels of technological integration (high, moderate, and low) are included. A proportional approach was used to select participants from both public and private schools to maintain representation.

**3.4 Instrument for Data Collection**

The primary instrument for data collection was a structured questionnaire developed by the researcher. The questionnaire was divided into three sections:

* **Section A:** Demographic information (age, gender, school type, location).
* **Section B:** Availability and accessibility of technological resources.
* **Section C:** Frequency and effectiveness of technology use in the classroom.

The questionnaire utilized a Likert scale format, with response options ranging from "Strongly Agree" to "Strongly Disagree." The questionnaire was adapted from previous validated instruments used in similar studies on technology in education (Adewale & Alabi, 2019).

Additionally, structured interviews were conducted with selected school administrators to obtain qualitative insights into the barriers and opportunities for technology integration in secondary schools.

**3.5 Validity of the Instrument**

The instrument was subjected to face and content validity by a panel of experts in the fields of educational technology and educational research. Content validity was ensured by aligning the questionnaire items with the study objectives and research questions, while face validity was assessed through pilot testing with 20 randomly selected respondents from the population, as recommended by Nunnally (Nunnally 1978, p. 122).

Pilot testing helped refine unclear or ambiguous questions, ensuring that the final instrument was easy to understand and effectively measured the intended variables. Expert feedback ensured the instrument's construct validity, verifying that it accurately captured elements of technology integration in education.

**3.6 Reliability of the Instrument**

To establish the reliability of the instrument, a **test-retest method** was employed. The questionnaire was administered twice to the same group of 20 students from different schools, with a two-week interval between the two administrations. The **Cronbach's alpha coefficient** was used to measure internal consistency, yielding a reliability coefficient of 0.82, which is considered acceptable for educational research (George & Mallery, 2003).

Additionally, a **split-half reliability test** was conducted, where the questionnaire was divided into two halves, and the correlation between them was analyzed. The results showed a strong internal consistency, further validating the reliability of the instrument.

**3.7 Procedure for Data Collection**

The data collection process took place over a period of four weeks. The researcher, along with trained research assistants, visited the selected schools to administer the questionnaires. Before data collection, informed consent was obtained from participants, and they were assured of the confidentiality of their responses. The respondents were guided on how to fill out the questionnaire, and any unclear sections were explained to them. Data collection was completed in both rural and urban schools to capture the diversity in technology access across the district.

The step-by-step procedure included:

* Obtaining Approval: Permission was sought from the Edo State Ministry of Education and school principals.
* Training Research Assistants: Assistants were trained to ensure consistency in questionnaire administration.
* Conducting the Survey: Questionnaires were distributed to students and teachers during school hours.
* Interviews with Administrators: Face-to-face interviews were conducted with selected school heads.
* Data Verification & Storage: Completed questionnaires were reviewed for missing responses and stored securely.

**3.8 Method of Data Analysis**

The data collected were analyzed using descriptive statistics such as frequency counts, percentages, and means to summarize the participants' responses. In addition, inferential statistics such as t-tests and ANOVA were employed to test the research hypotheses. These methods are appropriate for determining relationships between variables such as technology access, usage, and academic performance (Pallant, 2020, p. 102). Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.

Inferential statistics were used as follows:

* Chi-square tests: To determine the relationship between school type (public/private) and technology availability.
* T-tests: To compare mean differences between urban and rural schools.
* ANOVA: To compare multiple school categories based on technology integration.

This robust analysis ensures a comprehensive understanding of how technology affects education in Edo South Senatorial District.

**CHAPTER FOUR**

**RESULTS**

The results of the study are presented in accordance with the research questions and hypotheses. Descriptive statistics, particularly mean scores derived from Likert-scale responses, are used to address each research question. The findings are organized and discussed in alignment with the structure of the research questions.

**4.1 Answers to the Research Questions**

**4.1.1 Research Question 1**

To what extent are technological resources available and accessible in senior secondary schools in Edo South Senatorial District?

To address this research question, items Q1 to Q6 were analyzed. These items focused on the presence of technological tools, the level of access provided to both teachers and students, equity in access, and internet connectivity across schools.

Table 1

|  |  |  |
| --- | --- | --- |
| **Item No** | **Statement** | **Mean Score** |
| Q1 | Technological resources are available in my school | 2.67 |
| Q2 | Students and teachers have adequate access to technology | 2.84 |
| Q3 | Measures are in place to ensure equal access to technology | 2.88 |
| Q4 | The school provides a stable internet connection | 2.91 |
| Q5 | There is a gap in tech availability between public and private schools | 2.03 |
| Q6 | Technological access is fairly distributed across departments | 2.68 |

**Interpretation:**  
From table 1, the mean scores for items Q1 through Q6 generally fall between 2.67 and 2.91. These scores indicate a moderately negative perception among respondents regarding the availability and accessibility of technological resources. Specifically, Q1 (M = 2.67) and Q2 (M = 2.84) suggest that both the presence and access to educational technology are not strongly established across most schools.

The perception that equal access measures are not significantly enforced (Q3, M = 2.88) and the inadequacy of internet connectivity (Q4, M = 2.91) are notable, as internet access is a foundational requirement for meaningful integration of digital tools. Particularly telling is Q5, which received a mean score of 2.03, indicating that respondents generally agreed there is a noticeable disparity in access between public and private schools, with public schools likely having fewer resources.

This set of responses suggests that while some technological resources may be present, they are not widespread or reliably accessible, which aligns with existing research highlighting the infrastructural and resource-based limitations of many Nigerian schools (Obi & Okoro, 2020).

**4.1.2 Research Question 2**

How prepared and what are the attitudes of teachers towards using technology in their teaching practices in these schools?

Items Q7 to Q11 provided insights into teachers' readiness, comfort, frequency of use, and perceived student engagement when using technology.

|  |  |  |
| --- | --- | --- |
| **Item No** | **Statement** | **Mean Score** |
| Q7 | Teachers have received formal training | 2.36 |
| Q8 | Teachers are comfortable using technology | 2.02 |
| Q9 | Teachers integrate digital tools in lessons | 2.84 |
| Q10 | Training is a major barrier to tech use | 2.10 |
| Q11 | Students are more engaged with tech-integrated lessons | 1.80 |

Table 2

**Interpretation:**  
These scores from table 2 reflects a generally low level of preparedness and confidence among teachers in using technology. For example, Q7 (M = 2.36) and Q8 (M = 2.02) indicate that most respondents disagreed or remained neutral about having received adequate training or feeling comfortable with using tech tools.

The very low score for Q11 (M = 1.80) is particularly revealing—it shows that teachers do not perceive a significant increase in student engagement resulting from technology use, possibly due to ineffective implementation or insufficient resources. Similarly, the response to Q10 (M = 2.10) indicates that a lack of training is a perceived barrier to adoption.

These findings highlight a critical gap in professional development and digital literacy among educators, echoing Ertmer et al.'s (2012) position that teacher beliefs and capabilities play a vital role in successful technology integration.

**4.1.3 Research Question 3**

What impact does technology have on student engagement and learning outcomes in these schools?

This research question was addressed using Q12 to Q17, which examined the perceived effects of technology on student participation, academic performance, learning preferences, and subject-specific gains.

|  |  |  |
| --- | --- | --- |
| **Item No** | **Statement** | **Mean Score** |
| Q12 | Technology improves class participation | 1.78 |
| Q13 | Students use technology to enhance subject understanding | 1.82 |
| Q14 | Tech use has improved student performance | 2.63 |
| Q15 | Students prefer tech-assisted over traditional learning | 2.95 |
| Q16 | Specific subjects are impacted more positively by tech | 2.63 |
| Q17 | Students face major challenges using technology | 2.99 |

Table 3

**Interpretation:**  
Responses to this set of items as shown in table 3 reveals limited positive impact of technology on student engagement and outcomes. Items Q12 and Q13 scored below 2.0, suggesting that teachers and administrators generally disagree that technology significantly improves participation or understanding.

Although Q15 (M = 2.95) suggests that students are slightly more inclined toward tech-assisted learning, the marginal difference indicates that traditional methods still hold sway. Q17 (M = 2.99) points to the existence of significant challenges in students' use of technology, such as poor infrastructure, lack of devices, or limited digital literacy.

In summary, the respondents largely perceive the impact of technology on student performance and engagement as minimal or inconsistent, likely due to the limited resources and weak implementation strategies in schools.

**4.1.4 Research Question 4**

What challenges do schools face in integrating technology into the educational process?

To assess the obstacles hindering technology adoption, responses to Q18 to Q25 were analyzed.

Table 4

|  |  |  |
| --- | --- | --- |
| **Item No** | **Statement** | **Mean Score** |
| Q18 | Financial, infrastructure, and admin challenges exist | 2.98 |
| Q19 | The school lacks a stable internet connection | 2.88 |
| Q20 | The school rarely updates tech infrastructure | 2.54 |
| Q21 | Support is available when facing technical difficulties | 2.84 |
| Q22 | School policies support tech integration | 2.67 |
| Q23 | Clear strategies for promoting tech are in place | 2.69 |
| Q24 | The school evaluates tech’s impact on academics | 2.67 |
| Q25 | There is a plan for expanding tech adoption in the future | 2.95 |

**Interpretation:**  
The responses in table 4 shows that respondents acknowledge the existence of systemic challenges, with mean scores clustering around 2.5 to 2.9. These include infrastructure, financial constraints, and lack of clear strategies. For example, Q18 (M = 2.98) indicates general agreement that there are serious institutional challenges, while Q19 and Q20 (M = 2.88 and 2.54, respectively) suggest that schools often struggle with connectivity and outdated equipment.

While Q25 (M = 2.95) shows that respondents are somewhat hopeful about future plans for technology expansion, the overall trend indicates that current policies and support systems are insufficient to overcome the barriers to effective tech integration.

**4.2 Testing of Hypotheses**

In this section, the hypotheses formulated in Chapter One were tested using inferential statistical techniques. Independent samples t-tests were conducted to compare responses between public and private school respondents with respect to the research variables. The results are presented below.

**2.1 Hypothesis 1**

**Null Hypothesis (H0):** There is no significant difference in the availability and accessibility of technological resources among senior secondary schools in Edo South Senatorial District.

**Tested Items:** Q1 to Q6 (Availability & Accessibility of Technology)  
**Groups Compared:** Public vs Private Schools  
**Statistical Test:** Independent Samples t-test  
**Significance Level:** 0.05

Table 5

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question** | **Description** | **t-Statistic** | **p-Value** | **Decision** |
| Q1 | Technological resources are available | -2.245 | 0.0281 | Reject H0 |
| Q2 | Adequate access to technology | -1.084 | 0.282 | Fail to reject H0 |
| Q3 | Equal access to technology ensured | -3.216 | 0.0023 | Reject H0 |
| Q4 | Stable internet connection is available | -0.528 | 0.5991 | Fail to reject H0 |
| Q5 | There is a gap in tech availability between public and private schools | -0.125 | 0.9008 | Fail to reject H0 |
| Q6 | Tech access is fairly distributed across departments | -0.876 | 0.3852 | Fail to reject H0 |

**Interpretation:**  
Out of the six items tested, Q1 and Q3 showed statistically significant differences (p < 0.05), indicating that public and private schools differ notably in the availability of technological resources and the fairness of access. For the other four items, the differences were not statistically significant, meaning there is no sufficient evidence to conclude that access and distribution of technology differ between the two types of schools across those areas.

**Conclusion:**  
Since some items (Q1, Q3) show significant differences, we partially reject the null hypothesis. This suggests that while there is some uniformity in certain aspects of access, there are important disparities in availability and equity of technological resources between public and private schools.

**4.2.2 Hypothesis 2**

**Null Hypothesis (H0):**There is no significant relationship between teacher preparedness/attitudes and the use of technology in teaching practices in these schools.

Table 6T-test Results Comparing Teachers and Non-Teachers on Preparedness and Attitudes Toward Technology

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Question** | **Description** | **t-Statistic** | **p-Value** | **Decision** |
| Q7 | Formal training received | 1.146 | 0.2621 | Fail to reject H0 |
| Q8 | Comfort level with using technology | -0.095 | 0.9248 | Fail to reject H0 |
| Q9 | Integration of digital tools | 1.105 | 0.2796 | Fail to reject H0 |
| Q10 | Lack of training is a major barrier | 1.138 | 0.2664 | Fail to reject H0 |
| Q11 | Student engagement with technology | -0.217 | 0.8295 | Fail to reject H0 |

**Interpretation:**Although teachers reported slightly higher scores in training (Q7) and integration of digital tools (Q9), none of the differences were statistically significant at the 0.05 level. This suggests a general consensus across respondents (both teachers and non-teachers), regarding the limited training, confidence and integration of technology in classroom practice.

**Conclusion:**We fail to reject the null hypothesis (H0). The findings show no significant relationship between teacher preparedness/attitudes and the use of technology, indicating that improving technology adoption will require not just addressing teacher perspectives, but also institutional training policies and hands-on implementation strategies.

**4.2.3 Hypothesis 3**

**Null Hypothesis (H0):** There is no significant impact of technology on student engagement and learning outcomes in senior secondary schools in Edo South Senatorial District.

**Table 7**  
Summary of Mean Scores for Perceived Impact of Technology on Student Engagement

|  |  |  |  |
| --- | --- | --- | --- |
| **Question** | **Description** | **Mean Score** | **Decision** |
| Q12 | Technology improves class participation | 1.78 | Fail to reject H0 |
| Q13 | Students use technology to enhance understanding | 1.82 | Fail to reject H0 |
| Q14 | Tech use has improved student performance | 2.63 | Fail to reject H0 |
| Q15 | Students prefer tech-assisted over traditional | 2.95 | Fail to reject H0 |
| Q16 | Certain subjects are more positively impacted | 2.63 | Fail to reject H0 |
| Q17 | Students face major challenges using technology | 2.99 | Fail to reject H0 |

**Interpretation:**The mean scores show that respondents largely disagreed or were neutral about technology significantly improving student engagement or academic outcomes. Items Q12 and Q13 had especially low scores (1.78 and 1.82), pointing to skepticism about technology’s effect on participation and comprehension. Q14 and Q16 indicated that while some improvement is perceived in academic performance, the impact is not strong. Q17 shows that student challenges persist, potentially hindering the effectiveness of technology.

**Conclusion:**We fail to reject the null hypothesis (H0). The evidence suggests that technology has not had a clearly positive impact on student engagement or learning outcomes in the surveyed schools. Further investment in training, infrastructure, and digital literacy may be necessary to realize the intended benefits of technology in the classroom.

**4.2.4 Hypothesis 4**

**Null Hypothesis (H0):** There are no significant challenges faced by schools in integrating technology into the educational process.

This hypothesis was tested by analyzing responses to Questions Q18 to Q25, which focused on identifying the financial, infrastructural, administrative, and policy-related challenges involved in the integration of technology into teaching and learning processes.

**Tested Variables (Q18 to Q25):**

* Q18: Financial, infrastructure, and admin challenges exist.
* Q19: The school lacks a stable internet connection.
* Q20: The school rarely updates tech infrastructure.
* Q21: Support is available when facing technical difficulties.
* Q22: School policies support tech integration.
* Q23: Clear strategies for promoting tech are in place.
* Q24: The school evaluates tech’s impact on academics.
* Q25: There is a plan for expanding tech adoption in the future.

To test this hypothesis, an independent samples t-test was intended to compare responses between school types. However, due to constraints in data structure and the complexity of diverse challenge types, a descriptive summary from Section 4.1 was relied upon for interpretation.

**Interpretation:**

From the descriptive statistics already presented, responses to these items mostly hovered around the neutral point (mean scores ranging from approximately 2.54 to 2.99). These scores suggest that while respondents acknowledge that challenges exist, there is no strong consensus regarding their severity or whether schools have implemented sufficient strategies to address them.

The items addressing infrastructure (Q18, Q19) showed relatively higher agreement about the existence of financial and internet-related constraints, whereas questions addressing strategic planning and policy (Q22–Q25) received more neutral or slightly positive responses, indicating uncertainty or inconsistency in implementation across schools.

**Conclusion:**

Given that no significant differences were testable and that the descriptive results lean toward mild agreement or neutrality, we fail to reject the null hypothesis (H0). However, the findings underscore the need for improved infrastructural development, clearer policies, and strategic implementation to support technology integration in education.

**4.3 Summary of the Findings**

The following are the major findings derived from the analysis of data in this study:

* Technological resources such as computers, projectors, and internet facilities are not adequately available and accessible in many Senior secondary schools within Edo South Senatorial District. There is also a significant gap in technology assessment between public and private schools.
* Teachers in the study areas have limited formal training and preparedness for integrating technology in the classroom. Their comfort level with technology and frequency of digital tool usage remain relatively low, with no statistically significant difference when compared with non-teacher respondents.
* The perceived impact of technology on student engagement and learning outcomes is relatively minimal. Respondents generally disagreed or remained neutral regarding improvements in student participation, comprehension, or performance as a result of technology use.
* Numerous challenges hinder effective technology integration in schools. These include financial constraints, unstable internet connections, insufficient support systems, and lack of strategic implementation policies. Respondents confirmed the presence of these challenges but varied in how severe or well-addressed they believed these issues to be.

These findings point to the need for strategic investment in infrastructure, teacher capacity building, and policy frameworks that support equitable access to and effective use of educational technology in the school system.

**CHAPTER FIVE**

**DISCUSSION, CONCLUSION AND RECOMMENDATIONS**

This chapter presents a comprehensive discussion of the findings, the conclusion drawn from the research, the implications for policy and practice, and recommendations for future actions. It also includes suggestions for further study. The discussion section critically interprets the findings in light of previous literature, providing a basis for understanding the practical and theoretical significance of the study.

**5.1 Discussion of the Findings**

**Finding 1: Availability and Accessibility of Technological Resources**  
The findings indicate that there is a general lack of adequate technological infrastructure in senior secondary schools, particularly in public schools within Edo South Senatorial District. The mean scores showed that technological tools such as computers, internet access, projectors, and digital learning materials are limited. This finding strongly aligns with the work of Obi and Okoro (2020), who reported significant disparities in ICT resource allocation among Nigerian schools. Similarly, Ojo and Abimbola (2017) emphasized the role of inadequate infrastructure as a major barrier to effective technology adoption.

However, this study adds new insight by revealing that even where infrastructure exists, it is often not functional, not up to date, or not equitably distributed across schools and classrooms. In many schools, the available tools are often not accessible to all students, leading to unequal learning experiences. Also, due to lack of maintenance and trained support staff, devices remain unused. This reinforces the argument that access alone is not enough; schools also need consistent power supply, internet access, maintenance plans, and trained technical support to sustain use.

**Finding 2: Teachers’ Preparedness and Attitudes Toward Technology**  
The study revealed that many teachers feel unprepared and lack confidence in using technology for teaching. This supports Ertmer et al.'s (2012) findings that beliefs and training heavily influence technology integration. The research also indicated that even where some form of training exists, it is often outdated, overly theoretical, or not practical enough to influence day-to-day classroom practices.

Interestingly, the perception gap between teachers and non-teachers (students and administrators) was minimal, suggesting a widespread acknowledgment of these challenges across different educational roles. The uniformity in responses suggests that the problem is systemic, not limited to a few individuals. In comparison to Adesanya and Idowu (2016), who recorded success in schools where regular ICT training was part of school policy, our findings suggest that such models have not been adopted widely in Edo South.

**Finding 3: Impact of Technology on Student Engagement and Learning Outcomes**  
Contrary to expectations, the findings showed that technology had a limited perceived impact on student engagement and academic performance. Most respondents disagreed or were neutral on whether technology significantly improved participation, understanding, or test scores. These results contrast with the optimistic reports by Adewale and Alabi (2019), who documented enhanced performance in tech-supported classrooms, particularly in science and math.

One possible explanation for this divergence lies in the inconsistent or superficial use of technology in classrooms. It is likely that while technology is available, it is not used in a way that is pedagogically effective or aligned with curriculum goals. The absence of digital literacy among both students and teachers could also hinder the full realization of benefits. This study contributes by highlighting the need for integrating technology meaningfully, not just materially.

**Finding 4: Challenges to Technology Integration**  
A wide range of challenges were reported by respondents, including financial constraints, lack of administrative support, outdated infrastructure, and inadequate maintenance. These challenges are consistent with the findings of Emenike and Osarenren (2018), who stressed that successful technology integration requires more than equipment—it demands robust policy frameworks, funding, and continuous evaluation.

What makes this study particularly valuable is its confirmation that even when schools are equipped with technology, systemic issues can still impede its effective use. From irregular electricity supply to insufficient ICT personnel, the environment in many schools is not conducive to digital learning. Furthermore, the study found that there is no consistent strategy in most schools for evaluating the effectiveness of the technology they deploy, thereby weakening feedback loops that could inform better decisions.

In addition, there appears to be no clearly defined strategy in many schools for how ICT resources are to be used. The lack of school-based ICT committees or monitoring teams has resulted in haphazard integration of technology. Even where tools exist, they are used inconsistently and without evaluating their impact on learning.

This study contributes by reinforcing the need for a structured, policy-driven approach to ICT use in education. Equipping schools without training, planning, and evaluation will not yield sustainable improvements.

**5.2 Implications of the Study**

The findings from this study have significant implications for multiple stakeholders:

* **For Policymakers:** This study highlights the critical need for education policymakers to develop more localized and context-sensitive ICT policies. Infrastructure provision is not enough; sustainable strategies must include continuous funding for maintenance, consistent teacher training, and data collection to monitor progress. Policies must also mandate the equitable distribution of digital tools to minimize the existing urban-rural digital divide. Furthermore, there is a need for clear implementation frameworks that detail how schools should utilize ICT for both teaching and administration.
* **For School Administrators:** The results of this research call for proactive leadership from school administrators. Heads of schools should be equipped to lead technology adoption through proper planning, by establishing ICT management teams, and by actively organizing training sessions for their staff. They are also responsible for ensuring that ICT resources are allocated equitably among all classes and teachers. Administrators must take steps to evaluate the effectiveness of the technology used, based on feedback from students and teachers, and make data-driven decisions to improve usage.
* **For Teacher Training Institutions:** One of the major findings of the study was that teachers feel unprepared to use technology effectively. Teacher education programs need to incorporate compulsory digital literacy and ICT integration modules. Beyond theoretical instruction, trainees should engage in real-life scenarios, simulations, and classroom-based practicum where they learn to use tech tools for lesson planning, assessment, and delivery. Ongoing professional development should also be offered to practicing teachers, tailored to the changing landscape of digital tools.
* **For Curriculum Developers:** For technology to be effectively integrated, the national curriculum must reflect the demands of 21st-century learning. Curriculum planners should revise content to incorporate digital competencies and align subject objectives with available technological tools. Assessment formats should also reflect technology-enhanced learning, using digital portfolios, online quizzes, and multimedia presentations. This alignment ensures that what is taught and assessed reinforces the use of ICT in the learning process.
* **For NGOs and Donors:** These organizations can play a significant role in bridging gaps in funding, training, and technology provision. Based on the findings, NGOs should go beyond donations of equipment to include the development of solar energy solutions for schools in off-grid areas, training programs for teachers, and student-centered digital literacy campaigns. NGOs can also partner with government and communities to ensure that their interventions are culturally appropriate and scalable.

These implications collectively point toward a systems-based approach, where the success of ICT integration depends not just on individual efforts but on the coordination between policies, institutions, and community actors. The sustainability of technology use in schools hinges on deliberate planning, capacity building, and long-term investment.

**5.3 Conclusion**

This research has carefully examined the impact of technology on teaching and learning in senior secondary schools in Edo South Senatorial District. By focusing on the availability and accessibility of technological resources, the preparedness and attitudes of teachers, the level of student engagement, and the challenges schools face in adopting technology, this study has provided meaningful insights into the current state of ICT integration in the region’s education system.

The findings show that while there is growing awareness about the potential of technology in education, actual implementation remains limited and uneven. Public schools, in particular, suffer from inadequate infrastructure, limited internet access, and minimal training opportunities for teachers. These factors reduce the overall effectiveness of technology as a teaching and learning tool. Despite the presence of some digital resources, they are often underutilized due to lack of maintenance, irregular power supply, and insufficient support systems.

Teachers, who play a central role in classroom technology adoption, are not always adequately prepared or confident in using digital tools. The study also found that students, although open to using technology, are not fully engaged in technology-driven lessons due to various barriers including limited access, poor instructional design, and lack of relevant content. Additionally, there are systemic challenges, such as unclear ICT policies, low funding, and weak administrative coordination, that continue to hinder meaningful integration.

In essence, this study concludes that while technology holds significant promise for transforming education, particularly in enhancing student engagement and improving learning outcomes, its successful integration requires more than just providing devices. It demands strategic planning, sustainable funding, policy alignment, teacher development, and stakeholder involvement at all levels.

Therefore, the conclusion drawn is that for Edo South Senatorial District to benefit from digital transformation in education, a collaborative and multi-dimensional approach is necessary one that aligns infrastructure development with human capacity building, policy reform, and continuous evaluation. If these components are put in place, the integration of technology can move from aspiration to reality, positively shaping the future of secondary education in the region.

**5.4 Recommendations**

Based on the findings and implications of this study, the following recommendations are proposed to improve the integration and effective use of technology in teaching and learning within senior secondary schools in Edo South Senatorial District:

* **Increase Investment in ICT Infrastructure:** Schools, particularly public institutions, must be equipped with basic ICT tools such as desktop computers, laptops, multimedia projectors, printers, and internet connectivity. Provision should also include alternative power sources, such as solar panels or generators, especially in schools with unstable electricity supply. This infrastructure must be consistently maintained and upgraded to meet emerging technological trends.
* **Mandatory and Periodic ICT Training for Teachers:** Teachers should be offered regular professional development opportunities focused on technology use in education. Training programs should go beyond theoretical sessions and include hands-on workshops that address lesson planning, instructional delivery, digital classroom management, and subject-specific educational technologies. These training sessions should be incentivized and monitored to ensure participation and impact.
* **Establish School-Based ICT Committees:** Each school should set up an ICT team composed of tech-savvy teachers and administrative staff tasked with overseeing ICT operations. These teams will coordinate hardware maintenance, provide technical support to staff and students, and collect usage feedback for ongoing improvements. They should also organize school-wide ICT initiatives and training schedules.
* **Policy Reforms:** Local education authorities and Ministries of Education should introduce regular assessments and audits to track ICT resource usage and effectiveness in schools. Monitoring tools can include digital attendance for ICT lessons, logs of equipment usage, student performance tracking on e-learning platforms, and feedback surveys. Schools with strong ICT integration outcomes can be used as models for others.
* **Student-Centered Digital Tools:** Curriculum planners and school administrators should prioritize the adoption of platforms that encourage student interaction, creativity, and critical thinking. These tools should be age-appropriate, curriculum-aligned, and designed to promote independent learning. Examples include virtual labs, interactive simulations, online quizzes, and multimedia storytelling platforms.
* **Strengthen Public-Private Partnerships:** The government should build strong partnerships with tech companies, NGOs, and donor agencies to provide resources, training, and digital content to underserved schools. Collaborations can include device donations, digital literacy campaigns, infrastructure support, and teacher fellowships.
* **Digital Equity Initiatives:** Special attention should be paid to reducing the digital divide between rural and urban schools. Government and non-governmental organizations should implement policies that ensure all schools, regardless of location, benefit equally from technology in education. This could involve mobile ICT labs, community ICT centers, or e-learning buses that reach remote areas.
* **Include ICT Use in Teacher Performance Appraisals:** To encourage consistent usage, teachers’ engagement with technology should be included as a key metric in their annual performance reviews. This would serve as motivation for self-development and promote accountability in adopting digital practices.

These recommendations aim to create a holistic and sustainable environment where technology is not just present but meaningfully embedded in the teaching and learning process across all secondary schools in Edo South Senatorial District and potentially across other regions facing similar challenges.

**5.5 Suggestions for Further Study**

1. Future studies could employ qualitative methods such as interviews and classroom observations to gain deeper insights into attitudes and behaviors.
2. Researchers may conduct comparative studies between different regions or states in Nigeria to determine geographical influences on technology adoption.
3. A longitudinal study could assess changes in learning outcomes over time in schools that implement continuous ICT upgrades.
4. Future research could investigate the impact of specific technological tools or learning platforms (e.g., Google Classroom, Moodle) on academic performance.
5. More focus could be placed on gender-based technology usage to explore any disparities between male and female students or teachers.

**References**

1. Adedayo, M., & Olarinre, F. (2020). Professional development and ICT integration: Challenges and prospects in rural Nigerian schools. *Journal of Digital Education and Development, 5*(2), 98–112.
2. Adesanya, P., & Idowu, S. (2016). Technology-enhanced learning and student engagement in science education: A Lagos case study. *Science Education Journal of Nigeria, 14*(1), 77–92.
3. Adewale, S. A., & Alabi, F. O. (2019). Technology integration and student performance in Nigerian schools. *Journal of Educational Technology, 12*(3), 45–56.
4. Adewale, T., & Alabi, K. (2019). The impact of technology integration on student academic performance in Nigerian secondary schools. *Journal of Educational Research and Development, 15*(2), 123–134.
5. Afolabi, R., Salako, B., & Okoye, D. (2023). The effect of learning management systems on assignment completion and satisfaction. *Nigerian Journal of Educational Technology, 19*(2), 66–81.
6. Ahmed, A., & Adebayo, F. (2020). Socioeconomic disparities in digital learning access in Northern Nigeria. *Journal of Educational Equity, 5*(2), 61–78.
7. Babbie, E. (2010). *The practice of social research* (12th ed.). Cengage Learning.
8. Bandura, A. (1977). *Social learning theory*. Prentice-Hall.
9. Bloom, B. S. (1956). *Taxonomy of educational objectives: The classification of educational goals*. Longmans, Green.
10. Chukwu, U., & Anozie, C. (2022). ICT policy and classroom implementation in Enugu State. *Nigerian Journal of Education Policy and Planning, 18*(1), 89–104.
11. Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). Routledge.
12. Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
13. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.
14. Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Springer.
15. Edo State Ministry of Education. (2023). *Annual school census report*. Benin City: Ministry of Education.
16. Emenike, C., & Osarenren, I. (2018). Enhancing technology integration in Nigerian schools: The role of professional development. *Journal of Teacher Education and Practice, 8*(1), 78–89.
17. Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423–435.
18. Fatoba, A. F., & Adeleke, M. (2022). Evaluating digital readiness of secondary school students in Lagos. *African Journal of Digital Literacy, 4*(1), 25–40.
19. George, D., & Mallery, P. (2003). *SPSS for Windows step by step: A simple guide and reference*. Allyn & Bacon.
20. Ibrahim, M., & Bello, A. (2019). Challenges of e-learning implementation in rural Nigerian schools. *Journal of Rural Education and Development, 7*(3), 101–115.
21. Kirkwood, A., & Price, L. (2014). Technology-enhanced learning and teaching in higher education: What is ‘enhanced’ and how do we know? *Learning, Media and Technology, 39*(1), 6–36.
22. Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.
23. Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge (TPACK)? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60–70.
24. Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
25. Mayer, R. E. (2001). *Multimedia learning*. Cambridge University Press.
26. Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017–1054.
27. Musa, A., & Ibrahim, S. (2020). Teachers’ perceptions and readiness for ICT use in Abuja classrooms. *West African Journal of Teacher Education, 10*(2), 55–70.
28. Nkwocha, E. U., & Ekeh, C. C. (2020). Interactive whiteboards and student retention in Imo State. *West African Journal of Instructional Technology, 10*(1), 55–72.
29. Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the internet worldwide*. Cambridge University Press.
30. Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). McGraw-Hill.
31. Obi, P., & Okoro, E. (2020). Barriers to technology integration in Nigerian secondary schools: A case study of Edo South Senatorial District. *African Journal of Education, 24*(4), 89–104.
32. Ojo, B., & Abimbola, T. (2017). The role of infrastructure in technology use in southern Nigerian secondary schools. *International Journal of Educational Technology, 11*(3), 321–339.
33. Okonkwo, A. O., & Udo, F. (2018). Technology usage and teacher productivity in South-East Nigeria. *Nigerian Journal of Teaching and Learning, 13*(2), 145–159.
34. Pallant, J. (2020). *SPSS survival manual* (7th ed.). McGraw-Hill Education.
35. Puentedura, R. R. (2006). Transformation, technology, and education. Retrieved from <http://hippasus.com/resources/tte/>
36. Reiser, R. A., & Dempsey, J. V. (2017). *Trends and issues in instructional design and technology* (4th ed.). Pearson.
37. Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
38. Schlechty, P. C. (2011). *Engaging students: The next level of working on the work*. Jossey-Bass.
39. Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology and Distance Learning, 2*(1), 3–10.
40. Skinner, B. F. (1953). *Science and human behavior*. Macmillan.
41. Tinio, V. L. (2002). ICT in education. *UN Development Programme*.
42. Umeh, G., & Eze, R. (2021). Gender perspectives in secondary school technology use. *Journal of Gender and Education, 6*(3), 112–126.
43. Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.
44. Warschauer, M. (2004). *Technology and social inclusion: Rethinking the digital divide*. MIT Press.
45. Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.