

Examining the Determinants of ICT Adoption and Utilization in Public Basic Schools

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Abstract: The study aimed to assess the factors that influence the adaption and use of ICT in public basic schools in an educational circuit. A descriptive survey research design was used for the study. The survey questionnaire was then analyzed. The population for the study consisted of the circuit's teachers, principals, and the circuit supervisor, with 99 participants. A simple random sampling was used to select the sample for the study. The sample size was 57 teachers from public basic schools in the circuit. The study founded that using computers in public basic schools in the Circuit encourages open learning, removes distance and time between teachers and students, supports the practice of previously taught concepts, and helps learners acquire concepts and skills like word recognition and vocabulary building. Most teachers in the Circuit believe that computers aid in content production, and research may be used for pedagogical activities and increase successful teaching. Most respondents feel computers may improve teaching and learning in basic schools. From the study, Insufficient computers, a shortage of electricity and unpredictable power supply, poor internet connectivity, and insufficient teacher training and refresher courses were the primary problems facing computer use in public basic schools. The study recommends that Curriculum planners, principals, and Ghana Education Service should create computer software that can monitor computing programs in our schools. Teachers should be supervised to guarantee computer use in teaching and learning; Computers, local area networks, open educational materials, computer-assisted instruction, television-assisted instruction, the internet, power, and other infrastructure should be provided by the government to aid teaching and learning.

Keywords: Influence, Teachers, Students, Adaption, ICT, Public Basic Schools.

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I. INTRODUCTION

Given the significance of formal education for a nation's socioeconomic development, every country should make sure that its inhabitants have access to high-quality education in all areas so they can actively engage in their own personal growth. Increasing the population's level of education has been acknowledged as a key component of society's economic growth. The modern realisation that incorporating computers into the classroom can greatly improve the calibre of learning results is what drew the researcher to this topic. In order to integrate computers and e-learning into the overall educational system, the Ghanaian government, acting through the Ministry of Education and the Ghana Education Service, developed the basic school computerisation policy (n.d.). To close the technology gap in the educational system, the Ghanaian government started a school computerisation project in 2010 and gave laptops to public elementary and junior high schools. For a successful computer integration project in teaching and learning, laptops and other infrastructure, including computer labs, desktop computers, projectors, internet access, and a steady power supply from

solar energy, were intended for almost all public basic schools in the country.

Students engage with knowledge in an active, self-directed, and constructive manner while using information and communication technology (ICT), which also modifies the teaching and learning process and produces a potent learning environment (Volman & VanEck, 2001). ICT is not just thought of as a tool that can be utilised in conjunction with or instead of current educational techniques. ICT is seen as a crucial tool for facilitating innovative teaching and learning approaches. Students' teamwork, communication, problem-solving, and lifelong learning skills should all be developed through its use (Plomp et al., 1996; Voogt, 2003).

Over the past 20 years, the idea of incorporating technology into curricula to improve teaching and learning has evolved (Dias & Atkinson, 2001; Dockstader, 1999). Technology integration has covered a wide range of topics, including teaching programming skills, self-directed practice and drill, interactive learning software, online training, testing, augmenting instructional delivery, and Internet-based access to information, communication, and publications.

These developments have been largely driven by advancements in hardware and software, the availability of computers in educational settings, and popular trends in instructional technology (Dias & Atkin). Technology integration is intended to be cross-curricular rather than develop into a stand-alone course or topic, claim Flanagan and Jacobsen (2003). Technology should be used as a tool to promote educational goals including problem-solving, collaboration, communication, and information-searching and assessment abilities, all of which are critical for preparing kids for the knowledge society (Drent & Meelissen 2007). Actually, creative ICT use can support student-centered learning (Drent, 2005). Because learning technologies may engage students' thinking, decision-making, problem-solving, and reasoning behaviours, teachers should employ them to improve student learning in all subject areas (Grabe & Grabe, 2001). In the information age, children must master these cognitive skills.

While ICT has the capacity to enhance independent self-paced learning, its potential may remain unfulfilled without a transformation in the prevailing learning and teaching paradigm (Bangkok, 2004). Indeed, educators hold a significant position in the transformation of the teaching and learning framework. It is essential for them to comprehend the prospective influence of technology within the realm of education. Furthermore, it is imperative that they evolve into proficient agents capable of leveraging technology within the educational environment.

The policy statement of the Ghana Information and Communication Technology for Acceleration Development Policy indicates that the nation experiences a notably low level of computer literacy and awareness. This deficiency has been recognised as a significant impediment to progress within the ICT industry and sector. Among the strategies to address this issue are the introduction of computers in all primary, senior high, vocational, and technical schools, as well as the development and restructuring of the pertinent ICT curricula across all levels of the educational system.

This report illustrates the reality that numerous educational institutions in developing nations, such as Ghana, experience a student-teacher ratio that can reach 80:1, and frequently face the challenge of having a computer lab that may contain as few as twenty computers for the entire school, if they are fortunate enough to have one at all. The insufficiency of appropriate hardware and software undermines the fundamental purpose of Ghana's ICT4AD, rendering it almost nonsensical. It is indeed unreasonable to consider the incorporation of ICT as a subject within the foundational school curriculum without ensuring the availability of essential resources that would equip children with the necessary practical skills and knowledge. The outcome is that students graduate from school lacking the essential skills necessary for effective productivity. This significantly influences productivity (Simon, 2008).

Information gathered from the Ningo-Prampram District Directorate of Education indicates that between 2011 and 2017, several basic schools in the district were

beneficiaries of computer donations from the government, philanthropists, and NGOs. Furthermore, a total of 900 educators received training focused on the incorporation of computer-based technology into pedagogical practices and learning environments (GES, Ningo-Prampram, 2018). The pivotal inquiry persists: are computers truly augmenting learning outcomes? In order to bridge this knowledge gap and enhance the existing body of literature, an empirical study was conducted. This study examines the influence of computer utilisation on public primary schools in the Mbole-Afienya Circuit of Ghana, located in the Ningo-Prampram District.

II. LITERATURE REVIEW

➤ *Teacher's Attitude and how it Influences Promotion ICT Use in School*

It is suggested that when educators view technology initiatives as inadequate for both their own requirements and those of their students, they are unlikely to incorporate the technology into their instructional practices. The successful integration of ICT into teaching is influenced by various factors, including the attitudes and beliefs of teachers regarding technology. (Hew & Brush, 2007; Keengwe & Onchwari, 2008). When educators maintain a favourable perspective on educational technology, they are well-positioned to offer valuable insights regarding the adoption and integration of ICT into teaching and learning practices. In 2009, Demirci carried out a study examining the attitudes of teachers regarding the implementation of Geographic Information Systems (GIS) in Turkey. The investigation employed a questionnaire to gather data from 79 geography educators across 55 distinct high schools. The findings indicated that despite the presence of obstacles like insufficient hardware and software, the favourable attitudes of teachers towards GIS played a crucial role in the effective incorporation of GIS into geography instruction.

A comparable investigation was carried out by Teo (2008), who surveyed pre-service teachers' attitudes regarding computer usage in Singapore. A total of 139 pre-service teachers were evaluated regarding their attitudes towards computers through a questionnaire that encompassed four key factors: affect (liking), perceived usefulness, perceived control, and behavioural intention to utilise the computer. He discovered that educators exhibited a more favourable attitude towards computers and a greater intention to utilise them compared to their perceptions regarding the usefulness of the technology and their ability to control it. Drent and Meelissen (2008) conducted a study examining the factors that influence the innovative use of ICT by teacher educators in the Netherlands. A total of 210 teachers participated in the study. The findings indicate that a student-centered teaching method, a favourable disposition towards technology, prior computer experience, and the educator's entrepreneurial spirit significantly enhance the innovative application of ICT in teaching.

Studies indicate that educators' perspectives on technology play a significant role in their willingness to embrace its benefits and incorporate it into their teaching

practices (Huang and Liaw, 2005). The utilisation of Acer netbooks by educators across six European Union countries revealed that a significant number of participants perceived a positive influence on their learning experience. It fostered personalised learning and extended study opportunities beyond the traditional school day. While there are potential benefits, certain educators convey doubt, indicating that the merits of incorporating ICT in education are not immediately evident. An empirical survey regarding the utilisation of ICT indicated that one-fifth of European educators felt that incorporating ICT into teaching did not enhance their students' learning experiences (Korte & Hüsing, 2007). A survey of UK educators indicated that their optimism regarding the potential benefits of ICT was tempered as they grew "rather more ambivalent and sometimes doubtful" about "specific, current advantages" (Becta, 2008, p. 45).

The experience that educators have with computers is positively associated with their attitudes towards them. Teachers with greater experience using computers tend to exhibit more positive attitudes towards them (Rozell & Gardner, 1999). Favourable perceptions of computers are anticipated to promote the incorporation of technology in educational settings (van Braak, Tondeur & Valcke, 2008). Woodrow (1992) states that for successful transformation in educational practice, individuals must cultivate positive attitudes towards the innovation. In many educational institutions, educators responsible for teaching ICT often lack enthusiasm for the subject or fail to engage with it positively, resulting in a lack of motivation among students when it comes to learning ICT.

➤ *Teaching Experience and Readiness*

Some studies have indicated that the experience of teachers in the classroom does not affect their integration of computer technology in instruction. Studies indicate that teaching experience plays a crucial role in the successful incorporation of ICT in educational settings (Koh et al., 2020; Teo et al., 2019; Al-fraihat et al., 2019; Agyei & Voogt, 2018). indicated that there is a significant correlation between teacher experience and the actual utilisation of technology. In her investigation, she uncovered that the effective utilisation of computers was associated with levels of technological comfort and the freedom to tailor instruction according to the needs perceived by the teacher regarding students. Baek, Jong, and Kim (2008) asserted that seasoned educators exhibit a lower readiness to incorporate ICT into their instructional practices.

Lau and Sim (2008) carried out a study examining the level of ICT adoption among 250 secondary school teachers in Malaysia. The findings indicated that older educators tend to utilise computer technology in the classroom more often than their younger counterparts. The primary factor may be that veteran educators, possessing extensive experience in teaching and classroom management, as well as proficiency in computer use, can seamlessly incorporate ICT into their instructional practices. The results of this study are consistent with the previous work carried out by Russell, Bebell, O'Dwyer & O'Connor (2003). It was observed that new teachers, despite being highly skilled with technology,

incorporated ICT in their teaching less frequently than their older counterparts. Two reasons were cited: new teachers' focus may be on how to use ICT rather than on how to incorporate it into their teaching. Secondly, novice educators may encounter various challenges during their initial years in the profession, dedicating a significant amount of time to understanding the school's curriculum and mastering classroom management techniques.

Boakye and Banini (2008) assessed the preparedness of teachers to utilise ICT in schools across Benin, Cameroon, Ghana, and Mali, aiming to ascertain the extent of teachers' involvement in the integration of ICT into education within these nations. Educators were enquired about their competencies regarding information and communication technology and its application in their teaching methodologies. Among the educators surveyed, 71% reported that they had never utilised a computer during class, whereas 10% indicated that they employed it for classroom activities. Approximately 44% had not utilised a computer for preparing lesson notes, whereas 49% had done so. One-third of the individuals who utilised it for lesson preparation did so "always," while the remainder did so "occasionally." The applications encompassed conducting Internet searches for content, composing lesson notes, and creating teaching and learning materials. Approximately 60% of educators perceive themselves as knowledgeable in web browsing, while 71% actively utilise email. As many as 78% of the educators acquired their computer skills independently. Despite the fact that certain educators did not utilise ICT in their teaching, there was a general consensus that computers have transformed the learning process for students.

A study conducted by Hennesy et al. (2010) examined the factors affecting the use of ICT in classrooms across Sub-Saharan Africa. The findings indicated that the successful integration of technology in schools is significantly influenced by the availability and accessibility of ICT resources. It has been noted that educational institutions are progressively integrating computers into their teaching, learning, and administrative functions; connectivity is on the rise, and students show a keen interest in utilising computers for their educational pursuits, even in the face of limited equipment availability. The research identified two primary reasons for the utilisation of ICT by educators. Initially, educators believe that their personal utilisation of computers enhances the learning experience, and additionally, they perceive that students gain advantages from engaging with the computers directly. The 1998-1999 survey evaluating the World Links schools programme identified significant barriers to computer usage by teachers, including insufficient class time, inadequate planning schedules, and the absence of a national policy regarding computer use in schools.

These studies employed various conceptual frameworks to analyse the degree of ICT utilisation, thereby providing insights into the advantages and effects of ICTs. The available information regarding the experiences of African learners, teachers, and school managers in relation to the use of ICTs is quite scarce. There is a scarcity of information regarding the supply chain of ICTs in schools, particularly concerning

the nature and extent of government ministry involvement, the engagement of parent and residential communities surrounding the schools, and the role played by the private sector. Prior to the integration of ICT in educational institutions, several critical factors need to be evaluated. For example, factors such as the student's age, gender, competence level, self-efficacy, and overall readiness for learning should be carefully considered.

➤ *Infrastructure to Support Integration of Computers in Education*

The utilisation of computers in education is inadequate to make substantial progress towards achieving the education for all objectives. The United Nations reports that, notwithstanding advancements, inequalities in educational access and learning results continue to exist across multiple educational indicators. In 2020, around 25% of primary schools worldwide lacked access to essential amenities, including electricity, potable water, and basic sanitary facilities. Furthermore, statistics regarding access to information and communication technology (ICT) and the availability of computers for educational purposes in schools are significantly lower, particularly in the least developed nations. United Nations. (2022). The supply of computers and additional infrastructure, including local area networks (LAN), open educational resources (OER), computer-assisted instruction (CAI), television-assisted instruction (TAI), internet access, and power, will facilitate successful teaching and learning. The rationale is that educators and students will have many options in selecting ICT technologies that most effectively facilitate knowledge acquisition. Nevertheless, numerous schools in underdeveloped nations experience restricted access to such infrastructure owing to insufficient governmental investment in ICT. Access to ICT infrastructure and programs is widely recognised as beneficial for enhancing teaching and learning (Tondeur, Valcke, & van Braak 2008).

The Institute of Electrical and Electronics Engineers (IEEE, 2010, p. 8) defines a Local Area Network (LAN) as “a datacom system enabling multiple independent devices to communicate directly within a moderately sized geographic area via a physical communications channel with moderate data rates.” A local area network can enhance contact between educators and students, as well as optimise information administration inside educational institutions (Kwok, 2020). Consequently, governments and educational stakeholders must consider providing LAN access to schools lacking consistent internet connectivity.

Another crucial ICT infrastructure necessary for advancing education is open educational resources (OER). The OECD (2007) defines open educational resources as “digitised materials provided freely and openly for educators, students, and self-learners to utilise and repurpose for teaching, learning, and research.” The OECD (2007) reports that about 3000 open access courses are available from more than 300 universities globally, with the United States and China providing approximately 1750 courses.

Additional significant ICT infrastructure encompasses computer-assisted instruction. Bhalla (2013) characterises computer-assisted education as a pedagogical approach wherein a student utilises a computer to engage directly with and learn from programmed lessons. Computer-assisted instruction use tutorial software that does not require the presence of an instructor to facilitate learning. Computer-Assisted Instruction (CAI) offers learners a tailored educational experience, enabling them to go at their own speed, revisit tasks without repercussions, and bypass extraneous information (Mubin et al., 2020).

The deployment of ICT infrastructure in educational institutions is significantly dependent on the availability of electricity (UNESCO, 2020). This is due to the necessity of electricity for energising computers, servers, and various digital gadgets. In the absence of a consistent power supply, schools are unable to successfully integrate ICT into their teaching and learning processes (World Bank, 2018). Moreover, the absence of energy not only obstructs computer usage but also restricts access to internet-based educational resources (ITU, 2020). This may intensify existing educational inequalities and impede initiatives aimed at enhancing learning outcomes.

➤ *One Laptop per Child Policy in Ghana*

The One Laptop per kid policy (OLPCP) aims to empower children in underdeveloped nations by delivering a connected laptop to every school-age kid, particularly those in primary education. Consequently, numerous primary schools have already reaped the advantages of this policy, which commenced in 2008 (ICT in education policy, 2008). To achieve this objective, individuals must value and prioritise education for children globally. In Ghana, OLPCP aims to facilitate learning, self-expression, and exploration for approximately two billion children in the poor countries who have limited or no access to education. Although children possess an inherent need for information, numerous countries allocate inadequate resources to education, often investing less than \$20 annually per child, in stark contrast to the average of \$7,500 in the United States. Providing children with their own connected XO laptop grants them access to information, facilitates interpersonal connections, and serves as a catalyst for their future (Leeming, 2008).

➤ *Challenges Militating against the Effective use of ICT in Teaching and Learning Process in Schools*

Investing in ICTs is a significant financial commitment for any nation, regardless of its development status. In developing nations like Ghana, the investment in ICTs poses the challenge of allocating limited resources to technology or facing an expanding technological divide (Yusuf, 2005). Numerous studies have demonstrated the complex issues hindering the proper implementation of ICT in the educational process inside schools. These encompass: inconsistent power supply (Yusuf, 2005; Ofodu, 2007); and insufficient computers and peripherals (Ajayi & Ekundayo, 2003). The growing significance of technology in contemporary society motivated my research to concentrate on Ghana's education policymakers who have effectively incorporated technology into the educational framework.

Policymakers prioritised imparting important ICT skills to students, facilitating the application of technology in daily life and improving their understanding of courses such as mathematics (Unesco, 2019). A crucial insight from previous programs is that simply supplying schools with costly equipment is inadequate; enduring success necessitates extensive support for teacher professional development, national ICT-in-education policies, and community engagement.

The predominant difficulty identified in the literature is the absence of adequate training (Ghavifekr & Wan Athirah, 2015). A persistent problem in studies regarding ICT integration in education is the insufficient training opportunities for educators. Research has continuously demonstrated that teachers' insufficient preparation in utilising ICT in the classroom is a substantial obstacle to effective technology integration (Koh & Chai, 2016; Tondeur et al., 2017). Recent research in Turkey has underscored the significance of continuous professional development for educators in ICT, identifying inadequate training as a primary barrier to effective technology integration (Yerdelen & Temizkan, 2020). It is crucial to offer pedagogical training for educators instead of merely instructing them on the usage of ICT tools (Becta, 2004). Cox et al. (1999a) contend that to persuade educators of the merits of incorporating ICT in their instruction, their training must emphasise pedagogical considerations. The findings of the study conducted by Cox et al. (1999a) indicated that following participation in professional development courses in ICT, instructors remained unaware of how to implement ICT in their classrooms; rather, they only possessed the ability to operate a computer and configure a printer. They clarified that this is due to the courses primarily concentrating on instructors obtaining fundamental ICT abilities, rather than instructing them on how to enhance the educational dimensions of ICT. Consistent with the findings of Cox et al. (1999a), Balanskat et al. (2006) asserted that inadequate teacher training hinders educators from effectively utilising ICT in their classrooms and lesson preparation. They contend that this is due to training programs emphasising the development of ICT skills rather than addressing instructors' pedagogical methods about ICT.

The insufficient provision of computers and laboratories in educational institutions in both urban and rural regions constitutes an additional challenge. The government should enhance the availability of ICT facilities and ensure effective implementation. A recent survey by SRI International for World Links revealed that most teachers in African and Latin American countries identified insufficient hardware and software, along with unreliable Internet access, as major obstacles to computer use in instruction (Bjorn, et al., 2007).

A further problem closely associated with teacher confidence is educators' proficiency in incorporating ICT into teaching practices (Becta, 2004). In Australian research, Newhouse (2002) discovered that numerous educators possessed insufficient knowledge and abilities for computer utilisation and exhibited a lack of enthusiasm regarding the integration of additional learning facilitated by the

incorporation of computers into their instructional methodologies. Recent studies indicate that the extent of this barrier varies by country. Research indicates that in developing countries, teachers' insufficient technological proficiency is a primary obstacle to their acceptance and use of ICT (Pelgrum, 2001; Al-Oteawi, 2002). In Syria, the primary obstacle identified is instructors' deficiency in technological proficiency (Albirini, 2006). Similarly, in Saudi Arabia, insufficient ICT skills pose a significant barrier to the integration of technologies in science education (Al-Alwani, 2005; Almohaissin, 2006). Empirica (2006) published a report on the utilisation of ICT in European educational institutions. The report's data was sourced from the Head Teachers and Classroom Teachers Survey conducted across 27 European nations. The findings indicate that teachers who do not utilise computers in classrooms assert that a "lack of skills" is a limiting factor hindering their usage of ICT for instruction. A global survey by Pelgrum (2001), with nationally representative samples from 26 countries, revealed that teachers' deficiencies in knowledge and abilities constitute a significant barrier to the use of ICT in elementary and secondary education. Balanskat et al. (2006) found that "in Denmark ... many teachers still opted not to utilise ICT and media in instructional contexts due to insufficient ICT skills rather than pedagogical or didactic considerations," whereas "in the Netherlands ... teachers' ICT knowledge and skills are no longer seen as the primary obstacle to ICT utilization" (p. 50). Consequently, insufficient teacher competency may constitute a significant obstacle to the incorporation of technology in education. It may also be a contributing factor to reluctance to change.

The level of exposure and familiarity that educators and learners have with IT equipment plays a significant role in the integration of ICT. Increased exposure to IT tools among teachers and students leads to greater practice and utilisation in the classroom. Exposure removes fear, anxiety, and curiosity, fostering confidence for a smoother experience (Farris, 2001). A report from the National Institute of Multimedia Education in Japan (2003) demonstrated that enhancing student exposure to educational technology via curriculum integration significantly and positively influences achievement in knowledge, comprehension, practical skills, and presentation skills. The exposure of students to ICTs facilitates the use of images, which can significantly enhance their memory retention. Educators can effectively clarify complex instructions and ensure that students comprehend the material. Additionally, teachers have the ability to design interactive classes, making lessons more enjoyable and thereby increasing students' attention and concentration.

In the USA, approximately 2000 schools have partnered with Google to implement its lightweight Chromebooks, with over 40% of students utilising various tablets in their advanced national writing project classrooms (Pew Research Centre and American Life Project, 2012). It is commonly held by parents that the utilisation of computers could enhance their children's academic performance and prospects for future employment (Stock & Fishman 2010). This encourages the purchase of computers with internet access to support children's academic success. The current technological

advancements have led to a decrease in computer prices, prompting parents to purchase computers for home use. Students utilise those computers to reinforce their school learning (Stock & Fishman 2010). Becker (2000) indicates that students are more inclined to utilise home computers for entertainment rather than for academic purposes. The attitudes of secondary students significantly influence a school's readiness to adopt e-learning (Mulwa, 2012). Children are exposed to technology not only at home but also at school through new ICTs. Therefore, educational institutions require innovative technology strategies and frameworks. US data (NCES, 2011) indicates that teachers' use of computers for specific activities in school positively influences students who have access to computers at home and in the library, resulting in higher levels of science literacy. The level of students' exposure to ICTs in both home and school environments is significantly high; however, the effects of this exposure on the integration of ICT in education remain inadequately documented. The influence of students' engagement with ICT during out-of-school hours significantly surpassed that of their in-school ICT exposure on their performance in mathematics and science.

Veen contends that “without hardware and software, the utilisation of information technology would be impossible” (1993, p. 1). Granger et al. (2002) contend that a significant barrier to the integration of ICT in classrooms is the absence of suitable and current materials. The deficient equipment comprises the absence of appropriate software for the subject matter and insufficient technical assistance to guarantee that daily operations proceed without disruption from unreliable equipment (Veen as cited in Maholwana-Sotashe, 2007).

Willis and Mash (2003) emphasise the significance of understanding students' perceptions of their own needs, positioning learners at the centre of ICT utilisation. The ICT curriculum must enhance learners' sense of technological autonomy; notwithstanding the well-intentioned ICT initiatives proposed by researchers and stakeholders, it is essential to consider learners' perspectives (Kennewell, Parkinson & Tanner, 2000). Technology must be integrated into the learner's educational context and should be essential to the learners themselves (Glatthorn, Boschee & Whitehead, 2006). Deane, Ruthven, and Henessy (2003) assert that learners are integral to the social system and that their viewpoints significantly influence the activities conducted in schools. Stakeholders must prioritise learners' viewpoints and attentively heed their voices (Mitra, 2018; Rudduck, 2007 amended by Lodge, 2018). This methodology recognises students as essential stakeholders in education, allowing educators to comprehend their demands more effectively and develop improved learning environments (Cook-Sather, 2020). This would facilitate comprehension of learners' perceptions of their experiences and the significance they attribute to their education, ultimately contributing to their overall performance.

Gregory (1970) contended that perception is a constructive process dependent on top-down processing. Perception is drawing inferences from visual stimuli and attempting to formulate an optimal hypothesis. He contended

that prior knowledge and past experience are essential in perception. Upon observing an object, an individual formulates a perceptual hypothesis grounded in prior knowledge. The formulated hypotheses are almost invariably accurate. Nonetheless, infrequently, perceptual theories may be invalidated by the observed evidence. Perception is the perception and interpretation of sensory information. Perception encompasses individuals' responses to information. Perception is the cognitive mechanism via which individuals interpret and structure sensory information from their surroundings, facilitating interaction and comprehension of their environment (Goldstein, 2020). Individuals convert unprocessed sensory information into significant experiences through perception. Researchers have identified various successful techniques to boost students' performance and motivation in ICT-based learning. Koh and Chai's (2016) study emphasised the significance of contextualising ICT education, offering genuine learning experiences, and cultivating a nurturing educational atmosphere. These tactics can foster students' authentic interest in ICT and motivate them to pursue associated career trajectories.

The availability of ICT infrastructure and resources within educational institutions is an essential prerequisite for the effective integration of ICT into the learning process (Plomp, Anderson, Law, & Quale, 2009). The successful adoption and integration of information and communication technology in educational settings is primarily contingent upon the availability and accessibility of various ICT resources, including hardware and software. It is evident that the absence of access to ICT resources will preclude teachers from utilising them. Consequently, the availability of computers, along with current software and hardware, constitutes essential components for the effective adoption and integration of technology. A study conducted by Yildirim (2007) revealed that the availability of technological resources significantly enhances teachers' pedagogical application of ICT in their instructional practices. A comprehensive examination involving 814 faculty members within Turkey's higher education system revealed that a significant proportion of the participants indicated access to computers and the internet. Specifically, 82.5% of the faculty members reported having access to computers, while 81.2% confirmed their internet accessibility (Usuel, Askar & Bas, 2008). The availability of hardware and software is crucial, as is the employment of appropriate tools and programs to enhance the processes of teaching and learning (Tondeur, Valcke, & van Braak, 2008). “The integration of suitable technology necessitates a thorough examination of the affordances and constraints (Friedhoff, 2008, cited in Chen, 2010, p. 3) associated with a technological tool when it is employed in educational settings.” Furthermore, it is essential to delineate the accessibility of ICT resources. In a study conducted by Dexter and Reidel (2003) focussing on pre-service teachers, it was found that 37.4% of the teachers had access to computers, while only 14.4% of the students enjoyed similar access. This suggests a disparity in computer availability, favouring teachers over students. It is evident that fostering a student-centered approach to technology learning

necessitates that learners are provided with access to high-quality technological resources.

Educational institutions must be furnished with the requisite ICT infrastructure to furnish future generations with the essential tools and resources for access and utilisation, thereby enabling them to acquire the anticipated competencies (Gulbahar & Guven 2008). Educational institutions are furnished with various forms of technological infrastructure and electronic resources; the presence of hardware, software, and network infrastructure is essential for the integration of ICT in the educational sphere (Afshari 2009). He further posits that restricted access to computers constitutes an impediment to the effective utilisation of these devices in educational settings. Mumtaz (2000) posits that numerous scholars have suggested that insufficient financial resources to acquire the requisite hardware and software is a significant factor contributing to teachers' reluctance to integrate technology into their classrooms.

In a further investigation aimed at understanding the determinants affecting the integration of ICT in classrooms across Sub-Saharan Africa, Hennesy et al. (2010) observed that the successful incorporation of technology within educational institutions is significantly contingent upon the availability and accessibility of ICT resources. It has been noted that educational institutions are progressively integrating computers into their teaching, learning, and administrative frameworks; connectivity is on the rise, and students exhibit a keen enthusiasm for utilising computers in their educational pursuits, even in the face of limited equipment availability.

Bransford (1999) asserts that the effective use of ICTs facilitates the paradigmatic transformation in both content and pedagogy crucial to 21st-century educational reform. With supportive policies and execution, ICT in education can facilitate the acquisition of knowledge and skills that will equip students for lifetime learning. The advent of computers and Internet technology has facilitated novel methods of knowledge transfer. The new environment is founded on constructivist learning theories and represents a transition from a poorly executed teacher-centered pedagogy, characterised by memorisation and rote learning, to a learner-centred approach (Tinio, 2002). Emerging pedagogical environments, particularly those including network technologies as noted by Tinio (2002), promote active learning, facilitate innovative teaching, diminish teacher isolation, and motivate both educators and students to engage as active researchers and learners. The availability and accessibility of computers are mentioned as elements influencing ICT integration in teaching and learning. Clark (2000) and Millar (1997) assert that access to technology and software is crucial for the effective use of computers in educational settings.

Nonetheless, despite the accessibility of technology, scheduling and limited computer laboratories remain significant obstacles to ICT integration in teaching and learning. Insufficient pragmatic considerations, such as limited access to ICT, can impede the comprehensive use of

ICT (computers, mobile phones, and the internet) in education. The accessibility and utilisation of ICT are essential components of effective education; thus, the advantages of ICT in education can be actualised when students have access to ICT tools and employ them pedagogically. Due to the high costs of technology in poor countries, access to and utilisation of technology in educational institutions may be more challenging than in affluent nations. The ratio of teachers to students regarding access to and utilisation of ICT tools may vary considerably across developing and developed countries (Ministry of Education, 2002).

Access to the utilisation of ICT technologies, including the Internet, computers, and mobile phones, is limited among students and teachers in schools. In Ghana, it is challenging to draw definitive conclusions regarding effective educational models that accommodate students (digital natives) and teachers (digital immigrants) for the successful integration of ICT into education during this technological era. Numerous studies have demonstrated the intricate issues hindering the proper implementation of ICT in the educational process within schools. The factors encompass: inconsistent power supply (Yusuf, 2005; Ofodu, 2007); and insufficient computers and peripherals (Ajayi & Ekundayo, 2003).

The study literature on ICT implementation indicates that it encompasses numerous contributing aspects (Mumtaz, 2000). An analysis of current research on the determinants of teachers' ICT adoption identifies two distinct categories of factors: non-manipulative (e.g., infrastructure, training) and manipulative (e.g., incentives, administrative pressure) that influence teachers' choices to incorporate ICT into their pedagogical practices (Teo et al., 2020).

III. METHODOLOGY

This research employed a descriptive survey as its methodological approach. Research that elucidates the characteristics of a particular phenomenon is descriptive. It assesses and communicates the present circumstances. Descriptive research involves gathering data to evaluate hypotheses or address research questions regarding the subject of the study (Grey, 2004). Amedahe (2002) asserts that the objective of descriptive research is to accurately depict activities, objects, processes, and individuals. Descriptive study encompasses significantly more than only posing enquiries and supplying responses.

➤ *Population and Sampling Techniques*

The study's population comprises 99 participants, including the circuit's teachers, principals, and the circuit supervisor. The population of this study comprises all educators at Mobole's public primary schools within the Afienya Circuit. Ninety-two instructors are employed in the six public basic schools comprising the Mobole-Afienya Circuit within the Ningo-Prampram District. Six principals and a circuit supervisor engaged in the study to offer insights regarding administrative support for the integration of technology in classroom instruction and learning.

The sample comprised 57 educators from primary schools within the Mobole-Afiencya public school circuit, representing 58% of the total population. Asamoah-Gyimah and Amedahe (2013) assert that a sample size of 5–20% of the population is appropriate for generalisation in most quantitative investigations.

➤ Instrumentation

The researcher utilised a modified structured questionnaire to collect the necessary data for the investigation. The questionnaire comprised both closed-

ended and open-ended items utilised to gather the necessary information for the investigation. The objective was to collect data regarding the impact of computer usage in public elementary school classes. All respondents were literate; therefore, the utilised method was appropriate. This strategy assisted the researcher in obtaining relevant information, hence preventing inconsistencies in the results from the respondents' answers to the questionnaires. The circuit supervisor, headteachers, and all educators answered an identical questionnaire.

IV. RESULTS AND DISCUSSION

➤ Sociology-Demographic Characteristics of Respondents

Table 1 The Age of Respondents

Age	No.	Percentage
18 – 29	7	14
30 – 39	11	21
40 – 49	26	50
50 and above	8	15
Total	52	100.0

Source Field: 2020

From Table 2, quite a high percentage of the respondents were within the age group 40 – 49, which is 50 per cent. Meanwhile, only 7 (14%) of the teachers lay between the age group 18-29. Most of the respondents fall within the old-age class of teachers.

➤ Sex of Respondents

The respondents' genders were examined to see how many teachers were males or females. This is shown in Table 3.

Table 2 Sex of Respondents

Age	No.	%
Male	13	25
Female	39	75
Total	52	100

Source Field: 2020

The data in Table 3 shows that 39 of the respondents were females representing 75%, while the remaining 13 (25%) were males. From the above, it can be concluded that most of the teachers used in this study were females. From the literature, it was realized that most women find using a computer in pedagogical skills challenging.

➤ Highest Educational Levels of Respondents

The highest qualification of the respondents was examined to determine their level of competency. Table 4 presents the highest qualification.

Table 3 Highest Levels of Respondents

Level	No.	Percentage
Master's degree	5	10
First degree	25	48
Diploma	12	23
'A' 3-YR P/S	7	13
Others	3	6
Total	288	100

Source Field: 2020

Table 4 shows the highest level of education of the respondents. The figure indicates that 25 (48%) of the respondents had a first degree as their highest level of education. Five of them, representing 10%, had master's degrees, 12 (23%) had diplomas, seven also had 'A' 3 YR P/S making 13%, while the remaining 3 (6%) had other

professional qualifications. This implies that many of the respondents have Diploma certificates, with the majority having their first degree. It implies that most of the teachers have taken some courses in ICT while in school pursuing their various programmes as a requirement from the universities in Ghana and have a fair idea of computer usage.

Teachers are implored to adopt and integrate computer into teaching and learning activities, but research has shown that there are several factors that influence teachers' adoption and use of computer and technology into teaching. In line

with that, respondents were further asked their perception on the factors that influence teacher's adoption and use of computers in public basic schools. This is presented in Table 4.

Table 4 Factors that Influence Teacher's Adoption and use of Computers

Impact on Learning	Response					Category
	SA	A	NR	D	SD	T
	No(%)	No(%)	No(%)	No(%)	No(%)	No(%)
Positive attitude of teachers towards the use of computer.	25(48)	27(52)	(-)	(-)	(-)	52(100)
Attitude of students.	(-)	2(4)	(-)	(-)	50(96)	52(100)
Personal characteristics (e.g. Gender, age, school level etc.)	18(35)	29(56)	(-)	5(9)	4(7)	52(100)
Computer experience of teachers	22(42)	19(37)	(-)	9(17)	2(4)	52(100)
Personal entrepreneurship, belief and behavioural intention of teachers.	41(79)	11(21)	(-)	(-)	(-)	52(100)
Training, capabilities and competence of teachers	33(63)	19(37)	(-)	(-)	(-)	52(100)
National and school policies.	(-)	5(10)	3(6)	33(63)	11(21)	52(100)
School administration support	(-)	9(17)	2(4)	1(-)	41(79)	52(100)
Availability of computer infrastructure and computers	23(44)	21(40)	(-)	8(16)	(-)	52(100)
Teachers' perception of the usefulness of computers	(-)	4(8)	(-)	48(92)	(-)	52(100)
Anxiety and fear	3(6)	5(10)	(-)	20(38)	24(46)	52(100)

Source Field: 2020

- Key: SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

A look at Table 12 shows that all the respondents (100%) were of the opinion and agreed/strongly agreed that positive attitude of teachers towards the use of computers; personal entrepreneurship, belief and behavioural intention of teachers and training, capabilities and competence of teachers, were factors that influence teachers' adoption and use of computer and technology into teaching and learning.

In addition, majority of the respondents 22 (42%) and 19 (37%) agreed and strongly agreed respectively to the assertion that computer experience of teachers affects their use of computer, while only 9 (17%) and 2 (4%) disagreed and strongly disagreed. In a similar instance, whereas most of the respondents 23 (44%) and 21 (40%) strongly agreed and agreed that "availability of computer infrastructure and computers" is another factor, only 8 (16%) disagreed. Again, majority of the respondents that is, 18 (35) and 29(56%) agreed and strongly agreed to the statement that personal characteristics such as (educational level, age, gender, among others) can influence the adoption of computer, while only 5(9%) disagreed. These shows that majority of the respondents agreed that computer experience of teachers'; personal characteristics and availability of computer infrastructure and computers affect teachers' adoption and use of computers in schools. Twenty-four of the respondents representing 46% and 20 (38%) strongly disagreed and disagreed respectively, when asked whether "anxiety and fear" was another factor that influences computer usage. However, 5 (10%) agreed, while the remaining 3 (6%) strongly agreed. This shows that majority of the respondents

44 (84%) do not see anxiety and fear as a factor that influences computer usage. Again, majority of the respondents 48 (92%) did not believe the assertion that "teachers' perception of the usefulness of computers" can influence it usage. Only 4 of them, representing 8% agreed to that assertion. However, 2 (4%) were undecided. This further indicates that majority of respondents do not think that teacher's perception of the usefulness of computers can influence it usage.

On the issue of "school administration support", 41 (79%) disagreed while 9 (17%) agreed. In relation to "national and school policies" 5 (10%) and 11 (21%) strongly agreed and agreed while 14 (27%) and 22 (42%) disagreed and strongly disagreed respectively. Finally, whereas an overwhelming majority of 50 (96%) disagreed to the item "attitude of students", only an insignificant number 2 making 4 percent agreed to that statement. This is an indication that, majority of the respondents were of the opinion that school administration support; national and school policies; and attitude of students. The analysis reveals that several key factors significantly influence teachers' adoption and integration of computers and technology into teaching and learning in the Mbole-Afienya Circuit of the Ningo-Pramam District. It includes positive attitude of teachers towards the use of computers; personal entrepreneurship, belief and behavioural intention of teachers; training, capabilities and competence of teachers; computer experience of teachers; availability of computer infrastructure and computers; and personal characteristics such as (educational level, age, gender, among others).

The findings align with existing research, which emphasizes the significant impact of teachers' attitudes on their adoption and integration of technology into teaching practices (Koh & Chai, 2016; Teo, 2019). Furthermore, the study confirms that positive teacher attitudes facilitate the effective adoption and integration of technology into teaching and learning (Hew & Brush, 2007; updated by Mouza & Lavigne, 2020). Additionally, the findings support the assertion that teacher anxiety, lack of confidence, and competencies are significant barriers to technology adoption (Russell & Bradley, 1997; updated by Ertmer et al., 2020).

V. CONCLUSION

The results indicate that the primary effects of computer use in education include promoting open learning, eliminating temporal and spatial barriers between educators and students, reinforcing previously taught concepts, and aiding learners in the acquisition of knowledge and skills. Conversely, the utilisation of computers in the classroom has significantly aided educators in content production and research endeavours, pedagogical activities, efficient communication among participants in the teaching and learning process, and the enhancement of effective instruction. The research indicated that the majority of participants believed computers could enhance teaching and learning in primary education. The principal use of computers for administrative purposes in public elementary schools were identified as composing final exam questions and inputting student academic records. The survey reveals that the majority of educators possess first- or second-degree qualifications. They are now more proficient and productive in using computers for instruction. The primary factors influencing teachers' adoption and utilisation of computers and technology in the Mobole-Afienva Circuit of the Ningo-Prampram District include teachers' positive attitudes towards computer use, personal entrepreneurship, beliefs and behavioural intentions, training, capabilities, competence, computer experience, and the availability of computers. Instructors and schools encounter significant problems such as insufficient computer resources, erratic power supply, restricted internet access, and poor teacher preparation. As a result, numerous educators and learners encounter difficulties in proficiently using computers, impeding their educational experience.

RECOMMENDATIONS

The study recommends that curriculum planners, principals, and the Ghana Education Service (G.E.S.) design programs to monitor and supervise computer use. Additionally, authorities should ensure that teachers effectively utilize computers in the teaching and learning process through regular monitoring.

The provision of computers and other essential infrastructure, including local area networks, open educational materials, computer-assisted and television-assisted instructions, internet access, and reliable electricity, will greatly enhance teaching and learning. This will enable

teachers and students to choose from a range of ICT tools to acquire knowledge most effectively.

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