Analyzing the Challenges Basic School Teachers Face in Integrating Information and Communication Technology into Teaching and Learning Activities in a Developing Country

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Article

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Abstract: The aim of this study was to evaluate the challenges basic school tutors face when integrating Information and Communication Technology (ICT) into their instructing and learning activities and to recommend possible strategies for addressing those challenges. This study employed an interpretive paradigm and a qualitative method approach to analyze the challenges basic school teachers face when integrating ICT into teaching in an emerging country, particularly Ghana. The participants of this study were chosen using purposive and snowball sampling techniques. A total of twenty (20) respondents were chosen for this study. The study found that teachers, despite their challenges, had a strong desire to integrate ICT into their instruction and learning activities. These challenges are the limited number of ICT tools and the absence of fully-subscribed software package that runs on them, the lack of electrical outlets in some classrooms, poor internet connectivity and power fluctuation. These teachers also had to deal with challenges like Trojan horses and spam despite the slow internet connectivity. The study suggested that basic school management should procure modern ICT tools and fully-subscribed software package to expand the school's ICT infrastructure giving teachers the choice to choose the ICT tools they will integrate into their teaching and learning activities for the successful integration of ICT into instruction and learning activities. Again, school management should ensure teachers are given basic training regarding ICT and its incorporation into tuition and learning activities to acquire the necessary competencies, understanding, and attitudes that will enhance teaching and learning activities.

Keywords: basic school; challenge; integration; information and communication technology; teaching and learning activities

1. Introduction

A new educational scheme with six years of elementary school, three years of junior secondary school, three years of senior secondary school, and four years of university education was adopted by the state of Ghana in 1987. This school schemes 6-3-3-4 structure is just one of several variations made to progress the Public Education System. The long-term objectives of the reform Computerised School Selection and Placement System (CSSPS) Report (CSSPS Report, 2006 as cited in Babah et al, 2020) were extending and enlightening access to secondary and postsecondary education. It may not be necessary to include the phenomenon of learning in only eight categories because it is so varied and diversified. Learning is not a "thing," but rather a notion. Only behavioural symptoms can be used to infer learning activity (Mensah, 2020). ICT is a general term for information processing, manipulation, and communication (Mensah, Quansah, Oteng & Nettey, 2023). This phrase, which is often used to refer to ICT, describes the hardware, software, network, and media elements that make it possible to gather, transfer, and process information (Lawrence, 2018). ICT is a common

abbreviation for Information Communications and Technology used for information processing, manipulation, and communication. Utilising these technologies entails using video-sharing websites like YouTube as well as social networking sites like Facebook and WhatsApp. Projectors, desktops, and printers are additionally used in communication in addition to computers (Lawrence, 2018). All of these technologies, as well as their usage in processing information for educational objectives, are included in the inclusion of ICT in tuition and learning institutions. It includes society's efforts to safeguard that people are knowledgeable about and skilled in using communication and computing technologies as well as how to use the related systems, software, and applications (Kler, 2014).

Information and Communication Technologies (ICTs) in the education sector play many roles, including giving students the skills they need to prosper in an information society, acting as a catalyst for changes in teaching methods, and enhancing and improving student performance and the teaching and learning environment, according to Alemu (2015), who carried out a study on the incorporation of ICT into tuition and learning practices in higher educational amenities. Tedla (2012), examined the significance, impact, and difficulties of ICT on tuition and learning in East African nations, it was found that using ICT in the classroom requires more of an experimental, hands-on, and interactive approach than a theoretical one. Further, the findings revealed that ICT enables learners to use and (process) data for effective problem-solving and gives them essential environmental preparation as well as offers them educational possibilities. Tedla (2012), further argued that the availability of ICT resources, teacher commitment, age, gender, educational background, and computer experience are all contributing factors to why the integration of ICT in many African nations falls short of expectations. All citizens are entitled to high-quality education from their governments. For a better future, ICT integration in schools encourages high standards and fair access to education. Additionally, ICT integration allows students to get the information and skills they need to be ICT competent (Salam, Zeng & Pathan, 2018). According to Mbodila, Jones, and Muhandji (2013) who researched the difficulties associated with ICT incorporation in the education sector, institutions that rely on their decision to integrate technology with technological possibilities are more likely to run into difficulties. They argued that organizations should therefore base their decisions on students' educational needs.

Arguably, the majority of higher educational institutions place a greater emphasis on student-centered learning and have grown more aware of the necessity of incorporating ICT into their methods of instruction. Quality education includes the following, per UNICEF (2000), as cited in Mensah et al., 2020: Learning environments that are healthy, safe, protective, and gender-sensitive; the provision of required resources and facilities; learners who are healthy, well-nourished, prepared to partake and learn; and learners who are supported in learning by their families and communities. Specifically in the areas of reading, numeracy, and communication, content that is expressed in suitable curricula and learning resources. ICT has been implemented at higher education institutions in a variety of fields, including admissions, administration, and finance (Abaidoo & Arkorful, 2014). According to Salam et al (2018) study on the challenges to ICT integration in public schools in modern society, advanced states have more advanced technology than emerging states, and as a result, they have had more success integrating ICT into instructing and learning. While attempting to offer high-value education to everyone and integrate ICT into their educational system, developing countries encounter several challenges in their efforts to reform education. Due to their lack of digital proficiency, teachers from developing countries struggle to compete with those from industrialized nations. According to Salam et al. (2018), the fundamental challenge facing developing countries in integrating ICT is striking a balance between economic realities and educational objectives. Instead of spending money on ICT integration, many countries spend a larger amount of their budgets on paying teachers' salaries and maintaining schools. These difficulties cause developing countries to fall short of their developed counterparts in accomplishing the necessary objectives. In order to address these issues, governments, universities, researchers, and other stakeholders in emerging nations are currently looking for answers. This study's main objective is to inspect the difficulties elementary school teachers encounter while incorporating ICT into their lessons and learning activities and to suggest potential solutions. Over the past ten years, academic

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libraries in Africa have started to incorporate technology into their daily procedures (Mutula, 2012 as referenced in Kwegyiriba et al, 2021).

Lawrence and Tar (2018), Alkahtani (2017), Alemu (2015), and Salam et al. (2018) are just a few scholars who have studied the complications that educational institutions have while incorporating ICT into their instruction and learning activities. According to their research, there are a variety of challenges to ICT adoption and incorporation, comprising a lack of ICT expertise, a lack of time to ensure suitable partaking in programme expansion, a lack of adequate training, the difficulty of the incorporation procedure, and a lack of technical support. Determining the challenges primary school teachers have when incorporating ICT into their instruction and learning activities is the goal of this study, which also aims to offer alternative solutions.

The study focuses on basic school teachers and ICT specialists within the Ga Central district of the Greater Accra Region of Ghana to provide answers to the following research questions:

RQ1: What are the problems teachers face when integrating ICT into teaching and learning activities?

RQ2: What strategies can be adopted to address these challenges teachers face when integrating ICT into teaching and learning activities?

The three implications of this study are as follows: it will inform educational administrators of the variables affecting teachers use of ICT in the classroom. The outcomes will once more inform those with an interest in education about the difficulties teachers encounter when incorporating ICT into their instruction and learning activities and will also highlight a number of suggestions and tactics for elementary school teachers to more effectively incorporate ICT into their tuition and learning activities.

2. Literature Review

A review of the literature on the subject is presented in this section.

2.1. Related Literature

Since humans began grouping into tribes and creating means of communication, the media and its extensive consequences have existed (Mensah et al.,2020). In their study on the problems of ICT incorporation in tuition and learning activities in secondary schools in South Africa, Mathevula and Uwizeyimana (2014) discovered that problems like a lack of ICT equipment at these schools, a lack of ICT equipment, and limited ICT resources hurt ICT integration as well as the majority of teachers' teaching responsibilities. The majority of the neighbourhood schools also lacked equipment beyond personal computers, photocopiers, and television. The survey also found that some teachers had received ICT training, but this training had very little effect on the teachers' ability to use ICT in their lessons and willingness to do so.

Information and Communication Technology (ICT) is expanding quickly in the modern world, and its impact on socioeconomic events cannot be overstated (Adomako, Quansah, & Mensah, 2022). The benefits and drawbacks of incorporating ICT into mathematics education and learning in Kenyan secondary schools were studied by Amuko et al. (2015). Face-to-face interviews and drop-and-pick questionnaire administration were employed in the study's descriptive research methodology to gather data from 12 public secondary schools in Nairobi County. The findings showed that most schools lack capacity-building support, which contributes to teacher laxness in the same procedure despite teachers' enthusiasm for integrating ICT into instruction. For instance, instructors are required to self-train to get technical knowledge and abilities because there is no available training for the use of ICT in the classroom.

Alkahtani (2017) researched the challenges involved in integrating ICT into teaching activities in four Saudi Arabian schools with a focus on both teachers and students. According to the study's findings, inadequate training and inadequate ICT tools were the biggest challenge(s) to teachers

 doi:10.20944/preprints202312.0650.v1

incorporating ICT into their tuition activities. Additionally, the majority of students and teachers lacked a fundamental understanding of how to use the ICT tools, and the majority of teachers lacked ICT teaching strategies. Accordingly, the study suggests that teachers, management, and principals in schools are important stakeholders who should be included in decisions about the integration of ICT to resolve existing issues and stop new ones from arising.

Mwanda (2017) conducted research on the application of ICT to biology instruction and learning in Kenyan schools. The study focused on the teachers and students in the Rachuonyo South Sub-County schools and employed a descriptive research methodology. 56 subject instructors from 15 different schools were surveyed using a questionnaire and an observation checklist. The findings indicated that the tuition activities were rather difficult because some schools had as many as 47 computers, while others just had 2. Additionally, the majority of teachers did not use accessible computers for their own personal growth in technological knowledge and abilities due to their inadequate training in computer programmes.

Alemu (2015) sought to determine the effects of ICT integration on the problems, possibilities, and future plans of higher education institutions. The study, which concentrated on 188 teachers, 5 department heads, and 10 school deans from Adama Science and Technology's five schools in Ethiopia, used a mixed-method research approach. Surveys, interviews, and observation were the main approaches used to acquire information. ICT integration into tuition and learning activities is not fully embraced, according to the study's findings after a descriptive analysis of the data, but both students and teachers have a favourable opinion of it. ICT has a difficult time being fully integrated into the tuition and learning procedure in universities due to issues like the lack of pedagogical support, the remoteness of ICT resources, the overcrowding of classrooms, and the lack of adequate training for university instructors to improve their technical skills.

Njenga (2015) investigated the various challenges that come with integrating technology into secondary schools in the Thika district. 59 high schools in the Thika district participated in the study. The district of Thika's headteachers were given questionnaires. The drive of the study was to regulate how the use of ICTs in secondary education was impacted by cost, technical difficulties, and teacher proficiency. The study was an expressive and employed Likert scale questions to gauge the severity of the establishment's ICT incorporation issues. According to the findings, secondary schools primarily used laptops, iPads, projectors and projection screen boards for their tuition and learning activities. According to the study, problems with ICT integration in high schools were caused by teachers' lack of proficiency with the technology. For example, on a scale of 1 to 5, where 1 signified "not confident" and 5, "very confident," teachers exposed a mean score of 2, indicating that they lacked confidence in their ability to use ICTs in the classroom. The study also showed that effective ICT integration in high schools in the Thika district was limited by the internet's volatility as well as the costs associated with the purchase of ICT facilities.

Amuko et al. (2015) investigated the challenges and opportunities associated with integrating ICTs in secondary education in Nairobi County. The descriptive study included 15 carefully chosen secondary school principals, 60 secondary school teachers, and 5 Deans. Data for the study was gathered via questionnaire and interviews. The outcomes of a descriptive study showed that there are many trials to the integration of ICTs in education, including a lack of teacher confidence during incorporation, a lack of ICT tuition expertise, a lack of positive attitudes toward the incorporation of ICTs in education, and a lack of ICT infrastructure. In contrast, the study found that teachers, particularly those under 35, were keen to use technology when preparing for class presentations and engaging with students. The study recommended developing the skills of enthusiastic instructors who should serve as role models for incorporating ICTs in the classroom. This method would assist in reducing difficulties and complacency among seasoned teachers about the incorporation of ICTs in the classroom.

In Ugandan secondary schools, Tusiime, Johannesen, and Gudmundsdottir (2020) investigated the challenges to ICT incorporation in teaching mathematics. The primary methods for gathering data for the study were questionnaires, interviews, and observation checklists. The study found that the main challenges to the ministry of education's execution of its education policy regarding the

 doi:10.20944/preprints202312.0650.v1

integration of ICTs in tuition were school characteristics and teacher factors. The study found that the biggest challenge to integrating ICTs into teaching was instructors' negative attitudes toward doing so. Lack of ICT tools, inadequate training for teachers to use the ICTs, and an absence of institutional rules on the use of ICTs in tuition was among the institutional features that hampered the incorporation of ICTs in instructing and learning activities. Lack of confidence, teacher compliance, and technical proficiency in the use of ICT was among the variables affecting the teachers. The study found that teachers who lacked confidence in their ability to use ICTs while teaching was apprehensive when utilizing it. As a result, they avoided using ICT tools in the classroom. The development of technology has enabled teachers to impart knowledge in a way that allows pupils to visualise what they are learning (Kwegyiriba, Mensah, & Ewusi, 2022).

Agyei and Voogt (2016) hints that introduction of Activity Based Pedagogy (ABL) had a critical effect on the expertise of pre-serviced teachers in their tuition sessions. Again, their study disclosed the use of spreadsheet had an impact on the summative results of mathematics as studied in the senior high schools. Their study outcome provided insights of the need to acquaint the pre-service teachers with the use of spreadsheets of which can foster a reflective effect on their tuition methods.

Instructional videos on YouTube can be used as a collaborating learning in the classroom and for students themselves as a result of ICT (Fynn, Kwegyiriba, & Mensah, 2021). The impact of ICT incorporation in tuition and learning activities is a subject of continuous discussion at the basic level of education and has to be thoroughly analyzed. In a developing nation like Ghana, there have perhaps been few studies done on the difficulties instructors experience while integrating ICT into basic schools. According to a study by Asafo-Adjei et al. (2023), pupils were using ICT to spend time on social media platforms. The majority of research on the difficulties teachers encounter in integrating ICT in the classroom has a specific focus. As a result, this study aims to analyse the difficulties elementary school instructors encounter when incorporating ICT into their lessons and learning activities and to provide potential solutions.

2.2. Conceptual Framework

The researcher adapted the activity theory and develop a conceptual framework for the study as shown in Figure 1. The adapted theory was drawn mainly from Lim and Hang's (2003) activity theory approach from their study titled “An activity theory approach to research of ICT integration in Singapore schools”.

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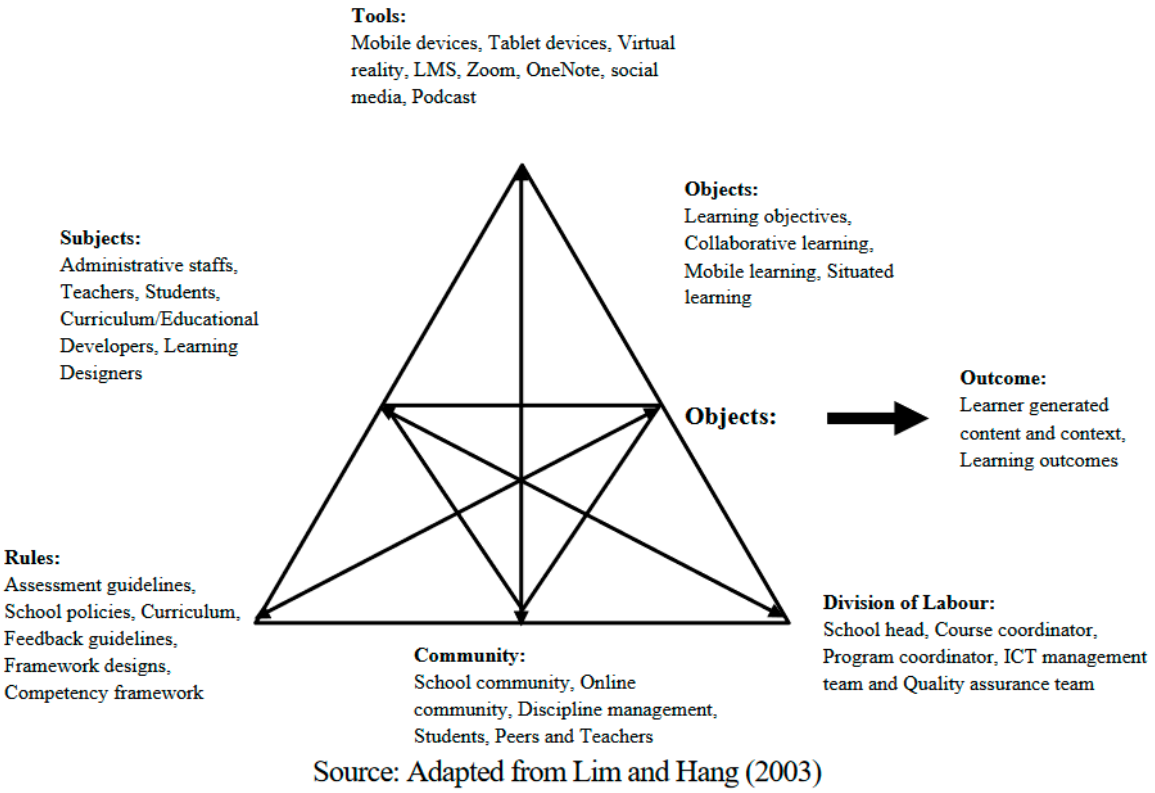

Figure 1. Conceptual Framework for Integration of ICT into Teaching and Learning.

2.2.1. Object

The object of the activity is considered in this study as Human Resource Development (HRD) which is indicated in the mission statement of the basic schools within the Ga Central district of the Greater Accra Region of Ghana. These include learning objectives, collaborative learning, mobile learning as well as situated learning.

2.2.2. Subject

The subject in the conceptual framework is considered the administrative staff, teachers, students, curriculum or educational developers and learning designers who are directly involved in the tuition and learning activities of the schools.

2.2.3. Community

The Community in the framework is the externalization of the environment within which the activity of the schools is undertaken in their academic environment. These include the schools' community, online community, discipline management, students, peers as well as teachers belonging to that community.

2.2.4. Tools

The tools in this study are the various ICT resources used in the basic schools for the integration of ICT to enhance teaching and learning activities. These resources include computing devices such as mobile devices, virtual reality, LMS, Zoom, OneNote, social media platforms, and podcasts among others.

2.2.5. Division of Labor

 doi:10.20944/preprints202312.0650.v1

Division of labor in this study is the job activities that are shared by the member (School head, Course coordinator, Program coordinator, ICT management team and Quality assurance team) within the schools.

2.2.6. Rules

Rules in this study refer to norms, policies, and regulations governing the schools' processes as well as the use of ICT tools. Again, rules in this study represent the directives such as assessment guidelines, school policies, curriculum, feedback guidelines, framework designs, and competency framework as well as available demanding ICT training for teachers and students and its integration into tuition and learning activities.

2.2.7. Outcome

The outcome construct in this study is regarded as the anticipated activity such as learner-generated content or context as well as various learning outcomes that will produce a large number of practically knowledgeable, skilled, and industry-ready students for the community.

3. Research Methodology

This research study reflects on the research onion as cited by Saunders et al. (2009), which adheres to the interpretive paradigm (Walsham, 2006), which aims to analyse the difficulties elementary school teachers encounter when incorporating ICT into tuition and learning activities and to suggest potential solutions. The study was conducted in the Ga Central district of the Greater Accra Region of Ghana focusing on two basic schools in the district, thus, Cosmos School Limited (CSL) and Apostle Safo School of Arts and Science (ASSAS). The research study utilized the inductive approach which implies the utilisation of specific thematic observations data collected to make generalized interpretations (Creswell and Plano Clark ,2007 as cited in Soiferman, 2010).

The study employs(ed) a qualitative methodology to attain the study's objectives. Multiple case studies were employed in this study because it is suitable (Yin, 2003) for explaining the various cases used in the study (Cavaye, 1996). Hence, a cross-sectional approach of sampling was used to collect the data from the participants at a specific point in time. The participants of this study were chosen using purposive and snowball sampling techniques depending on the significance of the respondent's understanding of the phenomenon. A total of twenty (20) respondents were chosen for this study. The respondents included 2 ICT departmental heads, 4 ICT teachers, and 14 teachers.

In this investigation, primary data were utilised. Data was gathered between June 2022 and October 2022. Utilising an audio recorder and a field note, the researcher performed a general face-to-face interview with the respondents utilizing an interview guide that satisfied the reading objectives. The interviews which lasted 38 minutes to 1 hour were recorded, transcribed, and reviewed. The researcher further obtained data by observing the activities of the participants while discharging their duties.

Following the interpretive paradigm, data analysis took place concurrently with data collection (Walsham, 2006). Inductive thematic evaluation was used to analyze the data to identify themes relevant to challenges basic school teachers face when integrating ICT into tuition and learning activities. The process involves drawing concepts inductively from the data that had been collected. Concerning the approach of inductive thematic evaluation, Braun & Clarke (2006) posits that though the thematic analysis method seeks to find patterns in the data collected to analyse and finally report on such themes identified, inductive thematic evaluation further is characterized by coding of collected data which is void of the preconceived perceptions of the researcher.

Braun and Clarke (2006) further suggested some six approaches to thematic analysis which was adopted and followed by the researcher for this study. Hence, begun by conducting an act of familiarisation with the data through cursory reading and re-reading the data to take note of emerging themes after data was transcribed. The researcher continued by initiating codes for the emerged themes of interest which resulted in synthesising the coded themes by the researcher for

 doi:10.20944/preprints202312.0650.v1

further review of themes to produce a thematic scheme of analysis. At this point the emerged themes were given labels by the researcher to prepare the final report of the analysis.

Ethical principles were upheld throughout the study. Informed consent was obtained from all participants before the questions were answered on the research instrument. Confidentiality and anonymity were maintained by using pseudonyms. The study adhered to ethical guidelines for research involving human participants. The study conformed to all the relevant ethical considerations pertinent to research involving human. Before any data was collected, all participants' informed consent was sought. All during the study, participants' confidentiality, privacy, and anonymity was maintained. During analysis and reporting, all personally identifiable information was taken out of the data. To protect the ethical integrity of the study, ethical permission was sought verbally and agreed from respondents (Creswell & Creswell, 2018; Saunders et al., 2018). Respondents consented to the study before it was conducted. This consent was voluntary, specific and without coercion. As a result, researchers did not contact any institutional review board for a written clearance. The research weas adequately described to participants.

4. Analysis of Data

4.1. Respondents' Demographic Characteristics

A total of 20 respondents (2 ICT departmental heads, 4 ICT teachers, and 14 teachers) were chosen for this study. Male respondents in this study are greater numbers than females. A total of fourteen males and six females participated in this study. Twelve respondents in the study were between the ages of 15 and 30, while eight of the respondents is among the ages of 31 and 45. The respondents' educational background has a big impact on how they perceive the difficulties elementary school teachers confront using ICT into tuition and learning activities. The data show that all of the respondents have completed their tertiary education. None of the study participants held a qualification with a level below tertiary. This shows that the study's participants are well educated, which enhances their understanding of operational procedures and their capacity to deliver high-quality service. The majority of respondents (10 respondents) had 6 to 10 years of experience or more, while 6 respondents had 1 to 5 years of experience and the remaining 4 respondents had 11 years of experience or more. This demonstrates that the majority of survey participants have experience working in the educational sector and are knowledgeable about its procedures.

4.2. Challenges Basic School Teachers Face When Integrating ICT into Teaching and Learning Activities

Giving instructors and students the chance to learn how to function and adapt in the data age requires the integration of ICT into instruction and learning activities. In order for educators to successfully employ technology in the future, they may need to overcome the difficulties posed by ICT integration in educational institutions (Habibu, Al Mamun, & Clement, 2012). Additionally, the Ministry of Education and the Ghana Education Service decided to computerise the selection and placement of candidates into Senior Secondary Schools and Technical/Vocational Institutions in Ghana in 2003 due to the numerous issues that plagued the manual scheme of school placement; as a result, the Computerised School Selection and Placement System (CSSPS) was presented in September 2005 (Babah, Frimpong, Ofori, Mensah & Ewusi, 2020). This demonstrates the importance of ICT in our educational scheme. The outcomes of this study indicate that tutors, despite their challenges, had a strong desire to incorporate ICT into their tutition and learning activities. Some of the problems tuition face in the integration of ICT in the classroom emanate from the ICT tools and the software (OS and Application programs) that runs on them. Thus, the absence of genuine software. Other challenges include limited ICT tools and a lack of electrical outlets in some classrooms to connect ICT tools.

These challenges have forced teachers in the schools to deliver students audio-visual materials using smartphones rather than projectors or television. Numerous research studies have identified several causes for the lack of access to technologies. Teachers in Sicilia's (2005) study expressed dissatisfaction with the challenges of having continuous access to ICT tools. This is a result of other

 doi:10.20944/preprints202312.0650.v1

teachers using the available ICT tools. Zyad (2016) exposed that most tuition agreed that the school's lack of ICT tools and the lack of time to evaluate software hinders instruction from incorporating ICT into their tuition and learning activities.

Further, the outcomes of this study showed that some tutors who are not familiar with or have little expertise in ICT also prefer the traditional methods of creating and delivering their lessons. Due to a lack of training opportunities, most tuition are unable to incorporate ICT into their instruction and learning activities. In this regard, teachers need some basic training to acquire the necessary competencies, understanding, and attitudes concerning the successful ICT integration that will enhance teaching and learning activities. These findings confirm the argument of Ghavifekr et al. (2016), that lack of training was one of the major three problems, with teachers with the integration of ICT in their tuition and learning activities. Ghavifekr et al. (2016) again assert that the challenge of training is undoubtedly complicated because it is essential to take into consideration several factors to guarantee the training's effectiveness. These were the hours allotted for instruction, methodological training, skill development, and ICT integration during preliminary teacher training. In their study on the difficulties integrating ICT in instruction and learning activities in South African schools, Mathevula and Uwizeyimana (2014) discovered that the majority of teachers' ability to integrate ICT was hampered by issues like scarce ICT resources, insufficient use of these resources, and a lack of ICT tools at these schools.

Theme one: *Constraints of technological infrastructure and teacher ingenuity in ICT integration*

A participant commenting on the theme of the constraints of technological infrastructure posited:

Head of ICT department CSL: There are not enough ICT tools in Cosmos School Limited. The available ICT tools cannot also be installed in some classrooms because there are no power outlets to connect them. Because of this, only teachers who have an interest in ICT use the available resources in the computer laboratory for their teaching activities. These and other difficulties have forced CSL teachers to deliver students audio-visual materials using their smartphones rather than projectors or television.

Theme two: *Obstacles experienced by educators as they navigate the integration of technology in the teaching and learning*

Another participant claims to the theme of obstacles experienced by educators towards the integration of technology suggested that:

Head of the ICT department and ICT teacher of ASSAS: The ICT tools are limited for all teachers to use for their teaching and learning activities. Because of this, some teachers prefer the traditional method of lesson plan preparation and delivery rather than using ICT tools to prepare and present their lessons in the classroom. This in my opinion contributes to some of the challenges teachers face when using ICT for teaching and learning activities.

Theme three: *Struggle arising from the disparity between the number of ICT tools and the student population*

Again, a participant of this study reiterated on the struggle arising from the disparity between ICT tools and student corresponding population by saying:

Science teacher and Social Studies teacher of CSL: Teaching with ICT tools sometimes becomes a challenge because the ICT tools in the school are few and the students have to take turns to observe what the teacher wants to show them. Also, the Public Address (PA) system is not big and loud enough for the students to hear the information being communicated clearly. In all, the ICT tools to student ratio is a challenge.

 doi:10.20944/preprints202312.0650.v1

Theme four: *Improved infrastructure to facilitate a more conducive environment for effective ICT integration and enhanced learning experiences*

Similarly, a participant hinted on the theme to improve infrastructure to facilitate a more conducive learning environment by saying:

Social Studies and Religious and Moral Education (RME) teacher of ASSAS: In ASSAS, not all classrooms have sockets to connect the ICT equipment, the use of a laptop or a smartphone in the classroom is also not favorable because their screen is too small for all students in the classroom to observe demonstrations when teachers try using their laptops or smartphone sometimes, also students are unable to practice what they were taught fully because of the limited number of ICT tools.

Theme five: *Maintenance of ICT tools to ensure their longevity and effective use in the educational environment.*

Moreso, a participant with a leadership background declared that for longevity and effective use in the educational environment requires maintenance of ICT tools by saying:

Head of the ICT department and ICT teacher of CSL: The challenges in CSL, have to do with how ICT tools are handled, some teachers don't know the handling of the ICT tools. Leading to the breakdown or malfunction of the tools. An example is an instance where PA systems fall and get damaged while carrying them.

Theme six: *Multifaceted challenges that impede the seamless integration of ICT in the learning environment at ASSAS*

Additionally, a participant affirmed the theme of the multifaceted challenges that impede the seamless integration of ICT by positing:

ICT teacher and Mathematics teacher of ASSAS: Some challenges teachers at ASSAS face with regard to ICT integration are that some teachers, as well as students, do not know how to safely handle the ICT equipment, thereby damaging the tools. Further challenges include slow internet connectivity, and electrical currents sometimes not being suitable. Another challenge is frequent power cuts known as 'Dumsor'.

These results support Lawrence and Tar's (2018) findings that challenges with technology adoption and ICT integration may be caused by a lack of ICT expertise, a lack of free time to ensure satisfactory contribution in expansion programmes, a lack of satisfactory training, the complexity of the incorporation procedure, and a lack of technical support. According to Alkahtani's (2017) study on the challenges involved in incorporating ICT into tuition activities in four schools in Saudi Arabia, inadequate training and inadequate ICT tools is the biggest challenge to teachers' ICT integration into their instruction and learning activities.

Other challenges include poor internet connectivity and power fluctuation problems popularly known as 'Dumsor' in the Ghanaian local parlance. Electrical currents that occasionally (low current) aren't appropriate for the ICT tools utilized in the schools are also a challenge.

Theme seven: *Educational hurdles in ICT integration*

English Grammar and Science teacher of CSL: Some teachers in CSL ICT knowledge and expertise is not at the level where they can smoothly integrate ICT into teaching and learning. Poor internet connectivity and electricity power fluctuations are part of the challenges teachers faced.

4.3. Strategies for Addressing Challenges Basic School Teachers Face When Integrating ICT into Teaching and Learning Activities

Technology for that matter ICT will inevitably become more widely adopted in education with time. Therefore, there should be some strategies that teachers, other educators, and researchers can employ to encourage the use of ICT in instruction and learning (Johnson, Jacovina, Russell & Soto, 2016). Since the attitude and views of teachers are crucial to how successfully an innovation is adopted (Ghavifekr, Kunjappan, Ramasamy & Anthony, 2016), it is important to understand how teachers feel about the integration of ICT into instruction and learning as an innovation and its effectiveness as a tool to improve tuition and learning. This will help teachers adopt better strategies to address their challenges faced in such innovation.

Theme eight: *Critical role of software and device management in creating a conducive environment for the effective integration of ICT into teaching and learning activities*

RME teacher of ASSAS and Social Studies teacher of CSL: For the reason that limited computing devices and pirated software have been a challenge teachers face when integrating ICT into teaching and learning both school-owned and personal computing devices should have the appropriate software and anti-virus programs installed on their device to make them work effectively as required to smoothly help integrate ICT into teaching and learning activities.

Theme nine: *Importance of strategic investment in ICT resources for an effective and seamless integration into teaching and learning activities.*

Mathematics teacher of ASSAS and English Grammar teacher of CSL: Due to the limited number of ICT tools in the school, the management of the school should procure additional modern ICT tools, considering teachers' input on the choice of technologies to expand the school's ICT infrastructure by resourcing every classroom with all the necessary ICT tools.

The study further found that some teachers like using traditional methods to carry out their obligations rather than ICT technologies. This is because these teachers have little or no expertise in ICT technologies and their usage. This study suggests that to persuade teachers of the benefits of integrating ICT in their tuition and learning activities rather than the traditional teaching method, the training of tutors in pedagogical concerns must increase.

Theme ten: *Encouraging a shift from traditional teaching methods to a more technology-integrated approach, promoting enhanced and innovative learning experiences in the classroom.*

Social Studies teacher of CSL and Science teacher of ASSAS: Teachers must be resourced and equipped with the knowledge and the technical know-how on how to handle and use the ICT tools and should be resourced with all the necessary ICT tools to encourage them to integrate ICT into their teaching and learning activities rather than the traditional method.

Theme eleven: *Importance of a comprehensive approach that combines training, support, and technical assistance to encourage teachers to shift from traditional teaching methods and embrace the effective integration of ICT in their instructional practices*

Head of ICT of ASSAS and ICT teacher of CSL: The school management should organize capacity-building training on ICT tools and their integration into teaching and learning activities to enhance the capacity of its teachers to assist in the efficient integration of ICT. Management should also provide technical help from professionals to teachers to assist them in overcoming the challenges that may arise when integrating ICT for teaching and learning. This will discourage teachers from the traditional method of teaching and may hold on to the integration of ICT in their teaching and learning activities.

5. Discussions

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The challenges revealed by this study are the limited number of ICT tools and the absence of fully-subscribed software package that runs on them, thus, both school-owned and personal computing devices, lack of electrical outlets in some classrooms, poor internet connectivity and power fluctuation. For this reason, the management of the schools in the district should procure modern ICT tools and genuine software to expand the school's ICT infrastructure giving teachers the choice to choose the ICT tools they will integrate into their teachings and learning activities. This will help provide every classroom with the necessary ICT resources for the successful incorporation of ICT into tuition and learning activities. Also, both school-owned and personal computing devices should have the fully-subscribed software package and anti-virus programs installed on their device to make them function whenever needed. These recommendations support the claim made by Johnson et al. (2016) that tutors should have a say in the technologies they decide to use in their lectures. It can be discouraging and upsetting for instructors to feel as though they have lost the flexibility to carry out their responsibilities in the way that best suits them because teaching is a very individualized experience. Alkahtani (2017) in their study of challenges involved in integrating ICT into teaching activities also asserts that tutors, management, and principals in schools are important participants who should be included in decisions about the incorporation of ICT to resolve existing issues and stop new ones from arising.

These suggestions are in line with Habibu et al. (2012) argument that if instructors are to be persuaded of the relevance of integrating ICT in their instruction and learning activities, then training for teachers with pedagogical difficulties should expand. These suggestions also support the findings of Tusiime et al. (2020), in their study on the trials to ICT integration in mathematics tuition in Ugandan high schools, that inadequate training for tutors to integrate ICT, into instruction and learning activities, and a lack of institutional rules on the use of ICT in instructing in the teaching environment was among the institutional features that hampered tutors desire to incorporate ICT into their tuition and learning activities. The ICT equipment is another issue. For it to be used, it must first be available and then in good functioning order. For the support of both teachers and students, quick access to technical support is crucial for equipment maintenance. The transition from a transmission model of learning to an inquiry model cannot help but be made easier by ICT tools that perform well and are kept in good condition (Alkahtani, 2017).

The studies also showed that some teachers and pupils do not know how to manage or use ICT products safely, which adds to the difficulties. For instance, Albirini (2006) recognised the instructors' lack of technological expertise as the main obstacle to ICT integration in tuition and learning in Syria. Similar to other countries, Saudi Arabia faces a major obstacle when attempting to integrate ICT into classroom instruction and learning: a lack of ICT skills (Habibu et al., 2012). The lack of knowledge and skills among instructors is a significant barrier to the integration of ICT in educational institutions, according to Pelgrum's 2001 survey of nationwide illustrative samples of schools from 26 different nations.

6. Conclusions

The purpose of this study was to analyze the trials basic school teachers face when integrating ICT into their tuition and learning activities and to recommend possible strategies for addressing those challenges. This study concluded that teachers, despite their challenges, had a strong desire to integrate ICT into their tuition and learning activities. Therefore, these findings have ramifications for preparing teachers to regularly integrate ICT while emphasizing developing basic IT competencies. These challenges are the limited number of ICT tools and the absence of fully-subscribed software package that runs on them, the lack of electrical outlets in some classrooms, poor internet connectivity and power fluctuation.

In addition, the study concluded that because teachers have little or no expertise in ICT technologies and their usage, some prefer using traditional methods of tuition and learning activities rather than integrating ICT technologies. Again, the schools do not give teachers enough time to become familiar with the use of ICT tools. The tutors also had to deal with challenges like Trojan horses and spam despite the slow internet connectivity.

7. Recommendations

The study recommends that basic school management should procure modern ICT tools and fully-subscribed software package to expand the school's ICT infrastructure giving teachers the choice to choose the ICT tools they will integrate into their teachings and learning activities. This will help provide the schools with the necessary ICT resources for the successful incorporation of ICT into tuition and learning activities. Also, management should ensure that both school-owned and personal computing devices should have the fully-subscribed software package and anti-virus programs installed on them to make them function whenever needed.

Once more, school administration should see to it that teachers receive introductory training on ICT and its integration into instructing and learning activities in order for them to develop the skills, knowledge, and attitudes necessary for successful ICT integration that will improve instruction and learning activities. To convince instructors of the benefits of incorporating ICT in instruction and learning activities rather than the traditional teaching approach, training for teachers in pedagogical concerns must also expand.

8. Research Limitations

This reading focused only on private basic schools within the Ga Central district of the Greater Accra Region of Ghana and does not contain any elements like public basic schools. Also, this study was confined to ICT departmental heads, ICT teachers, and basic school teachers. This study employed qualitative methodology to analyze the challenges basic school teachers face when integrating ICT into instructing and learning activities and to recommend strategies to address the challenges. Further, multiple case studies were employed in this study as directed by the title of the research.

9. Suggestions For future Studies

Adhering to the interpretive paradigm, this study employed a qualitative method approach. Other studies can consider different methods in a similar study across developing countries. Also, this study was confined to ICT departmental heads, ICT teachers, and basic school teachers. Future studies can include other stakeholders at the basic educational level in other developing economies. Again, this study employs two cases (multiple case studies). Future studies can consider more than two cases in a similar study from various developing economies. Further, future studies in this field of study can combine both public and private basic schools and larger sample size.

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References

Abaidoo, N. and Arkorful, V. (2014). Adoption and Effective Integration of ICT in Teaching and Learning in Higher institutions in Ghana. International Journal of Education and Research, 2(12), 411-423. https://ijern.com/journal/2014/December-2014/35.pdf

Adomako, E.K., Quansah, C. and Mensah, R.O. (2022). Assessing the Challenges of Information, Communication and Technology Education in the Rural Communities of Ghana: A Case of Sekyere South District, *Mediterranean Journal of Social Sciences*, *13*(4), 49-61. DOI: https://doi.org/10.36941/mjss-2022-0031

Agyei, D. D., & Voogt, J. M. (2016). Pre-service mathematics teachers' learning and teaching of activity-based lessons supported with spreadsheets. *Technology, pedagogy and education*, *25*(1), 39-59.

Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. Computers & Education, 47(4), 373-398.

Alemu, B. (2015). Integrating ICT into Teaching-learning Practices: Promise, Challenges and Future Directions of Higher Educational Institutes. Universal Journal of Educational Research, 3(3), 170-189. http://doi.org/10.13189/ujer.2015.030303

Alkahtani, A. (2017). The challenges facing the integration of ICT in teaching in Saudi secondary schools. International Journal of Education and Development using Information and Communication Technology (IJEDICT), 13(1), 32-51. https://files.eric.ed.gov/fulltext/EJ1142266.pdf.

Amuko, S., Miheso, M. and Ndeuthi, S. (2015). Opportunities and Challenges: Integration of ICT in Teaching and Learning Mathematics in Secondary Schools, Nairobi, Kenya. Journal of Education and Practice, 6(24), 1-7. https://files.eric.ed.gov/fulltext/EJ1078869.pdf.

Asafo-Adjei, R., Mensah, R.O., Klu, E, K. & Swanzy-Impraim, E. (2023). Social media and English language writing performances of a Ghanaian ESL class: The nexus, Cogent Education, 10:1, DOI: 10.1080/2331186X.2023.2189388

Babah, P. A; Mensah, R. O; Frimpong, A; Ofori, M. S; Mensah, L. O & Ewusi, E. (2020). A Comparative Systematic Review of Computerized School Selection and Placement System in Some Selected Countries. *Journal of Popular Education in Africa.* 4(6), 86 – 117.

Babah, P.A., Frimpong, A., Mensah, R.O., and Sakyi-Darko, M. (2020). Computerized School Selection and Placement System in The Greater Accra Region of Ghana: Perception of Stakeholders, *Journal of Educational & Psychological Research, 2* (2), 96-110

Braun, V., & Clarke, V. (2006) Using thematic analysis in psychology. Qualitative Research

Cavaye, A. (1996). Case Study: a multi-faceted research approach in IS. Information Systems Journal, 6(3), 227-242.

CSSPS Report (2006) Computerized School Selection and Placement System. Accra: MOE (Ministry of Education)

Fynn, P. K, Kwegyiriba, A & Mensah, R. O. (2021). Exploring the Use of YouTube and its Implications to Teaching and Learning in Technical University Education in Ghana. Journal of African Interdisciplinary Studies, 5(7), 46 – 59.

Ghavifekr, S., Kunjappan, T., Ramasamy, L., & Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. Malaysian Online Journal of Educational Technology, 4(2), 38-57.

Habibu, T. (2012). A Study of Difficulties Faced by Teachers in Using ICT in Classroom Teaching-Learning in Technical and Higher Educational Institutions in Uganda (Doctoral dissertation, Department of Technical and Vocational Education (TVE), Islamic University of Technology (IUT)).

in Psychology, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Instruction, 9(1), 65-78.

Johnson, A. M., Jacovina, M. E., Russell, D. E., & Soto, C. M. (2016). Challenges and solutions when using technologies in the classroom. In S. A. Crossley & D. S. McNamara (Eds.) Adaptive educational technologies for literacy instruction (pp. 13-29). New York: Taylor & Francis. Published with acknowledgment of federal support.

Kler, S. (2014). ICT Integration in Teaching and Learning: Empowerment of Education with Technology. Issues and Ideas in Education, 2(2), 255-271. https://doi.org/10.15415/iie.2014.22019.

Kwegyiriba, A., Fynn, P.K., Mensah, R.O., Aidoo, E., & Enchill, Y.T. (2021) Adoption of Technology Acceptance Model in Technical Universities Libraries: Implication to Higher Education in Ghana. *Journal of Education & Psychological Research,* 3(2): 247-251.

Kwegyiriba, A., Mensah, R.O., & Ewusi, E. (2022). The Use of Audio-Visual Materials in Teaching and Learning Process in Effia Junior High Schools, *Technium Social Sciences,* 31, 106-114

Lawrence, J. (2018). Factors Influencing Teachers' Integration of ICT in Teaching and Learning. International Journal of Adult Vocational Education and Technology (IJAVET), 9(2), 1-16. https://doi.org/10.4018/IJAVET.201804010.

Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. Educational Media International, 55(1), 79-105.

Lim, C. P., & Hang, D. (2003). An activity theory approach to research of ICT integration in Singapore schools. Computers & Education, 41(1), 49-63.

Mathevula, M. and Uwizeyimana, D. (2014). The Challenges Facing the Integration of ICT in Teaching and Learning Activities in South African Rural Secondary Schools. Mediterranean Journal of Social Sciences, 5(20), 1087-1098. https://www.researchgate.net/publication/269954676.

Mbodila, M., Jones, T. and Muhandji, K. (2013). Integration of ICT in Education: Key Challenges. Scholarly Journal of Mathematics and Computer Science, 2(5), 54-60. http:// www.scholarly-journals.com/SJMCS.

Mensah, R.O. (2020). The Attitude of Students towards the Learning of Social Studies and Their Performance: The Case of Accra Metropolitan Assembly in the Greater Accra Region of Ghana. *The International Journal of Humanities & Social Studies, 8*(2), 168-174. DOI No.: 10.24940/theijhss/2020/v8/i2/HS2002-072

Mensah, R.O., Acquah, A., Frimpong, A., & Babah, P.A. (2020). Towards Improving the Quality of Basic Education in Ghana. Teacher Licensure and Matters Arising: Challenges and the way Forward, *Journal of Education & Social Policy, 7* (3), 117-127, doi:10.30845/jesp.v7n3p11

Mensah, R.O., Agyemang, F., Acquah, A., Babah, P.A & Dontoh, J. (2020). Discourses on Conceptual and Theoretical Frameworks in Research: Meaning and Implications for Researchers. Journal of African Interdisciplinary Studies, 4(5), 53 – 64.

Mensah, R.O., Babah, P.A., Frimpong, A., & Acquah, A., (2020). Institutional perspective of political intolerance in the epoch of modernism: The causes and the way forward. The International Journal of Humanities & Social Studies, 8(4), 284-298 DOI No.: 10.24940/theijhss/2020/v8/i4/HS2004-107

Mensah, R.O., Quansah, C., Oteng, B. Nettey, J.N.A (2023) Assessing the effect of information and communication technology usage on high school student's academic performance in a developing country, Cogent Education, 10:1, DOI: 10.1080/2331186X.2023.2188809

Mutula SM (2012) Library automation in sub-Saharan Africa: case study of the University of Botswana. Program 46: 292- 307.

Mwanda, G. (2017). Integrating ICT into Teaching and Learning Biology: A Case for Rachuonyo South Sub-County, Kenya. International Journal of Education, Culture and Society, 2(6), 165-170. https://doi.org/10.11648/j.ijecs.20170206.12.

Njenga, L. (2015). Challenges facing the integration of Information and Communication Technology in secondary schools in Thika division, Kiambu County. [Master's Thesis, University of Nairobi]. http://erepository.mku.ac.ke/handle/123456789/2870

Pelgrum, W. J. (2001). Obstacles to the integration of ICT in education: results from a worldwide educational assessment. Computers & Education, 37, 163-178.

Salam, S., Zeng, J., Pathan, Z. H., Latif, Z., & Shaheen, A. (2018). Impediments to the integration of ICT in public schools of contemporary societies: A review of literature. Journal of Information Processing Systems, 14(1), 252-269.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students*. Pearson education.

Sicilia, C. (2005). The challenges and benefits to teachers' practices in constructivist learning: environments supported by technology.

Soiferman, L. K. (2010). Compare and Contrast Inductive and Deductive Research Approaches. *Online Submission*.

Tedla, B. (2012). Understanding the importance, impacts, and barriers of ICT on Teaching and Learning in East African Countries. International Journal for e-Learning Security, 2(2), 199-207. https://doi.org/10.20533/ijels.2046.4568.2012.0025.

Tusiime, W. E., Johannesen, M., & Gudmundsdottir, G. B. (2020). Teaching art and design in a digital age: challenges facing Ugandan teacher educators. Journal of Vocational Education & Training, 7(6), 1-21. https://www.tandfonline.com/doi/abs/10.1080/13636820.2020.1786439

UNICEF (2000). Curriculum report card. Working Paper Series, Education Section, Programme Division. New York: Author.

Walsham, G. (2006). Doing interpretive research. European journal of information systems, 15(3), 320-330.

Yin, R. K. (2003). Case study research: Design and methods (3rd edition).

Zyad, H. (2016). Integrating Computers in the Classroom: Barriers and Teachers' Attitudes. International Journal of