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Teacher's Perceived Usefulness of ICT: The Case of Standard-Based Curriculum Implementation in Ghanaian Basic Schools

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Abstract

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Purpose: The main aim of this study is to explore and evaluate the implementation of ICT in SBC in Ghanaian JHS with a focus on ICT integration as a pedagogical tool. The study aims to assess the resources available for implementing ICT as a pedagogical tool in Ghanaian JHS, the level of readiness and perceived ICT skills of teachers for the implementation of the SBC, the effectiveness of ICT in SBC for enhancing teaching and learning experiences, and the challenges of implementing/integrating ICT in an SBC for teaching and learning in Ghanaian JHS.

Theory: Technology Acceptance Model (TAM)

Method: The study employed a qualitative research method: semi-structured interview, and thematic analysis for data collection and analysis.

Results: The study found that while basic technological devices, such as projectors and laptops, were available, they were insufficient. Teachers recognize ICT as a powerful tool for enhancing educational outcomes, however, its successful integration in teaching and learning heavily depends on teachers' ability to adapt their instructional practices to these new technologies. Teachers' readiness and perceived ICT skills are key for implementing ICT-SBC, yet teachers require training to develop specific skills to incorporate ICT into the curriculum. Additionally, unreliable electricity, inadequate professional development, limited budgetary allocation, insufficient technological and instructional resources, and poor internet connectivity were the barriers to implementing ICT in schools.

Foreword

This thesis has taken a great deal of dedication and work to accomplish. My utmost gratitude goes to my wife, Joycelyn Donkor, for her steadfast support and faith in my abilities, which made it possible for me to complete my studies. I'm also grateful to friends and family members who helped and inspired me during my master's program.

I'm very grateful to my supervisor, Annika Bergviken Rensfeldt, whose expertise and guidance were beneficial in writing my thesis. Her feedback and insight helped shape my work.

I am thrilled to share the results of my study and grateful to those who supported me one way or the other in my academic journey.

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List of Abbreviations

ICT - Information Communication Technology

SBC - Standard-Based Curriculum

NICTP - National Information Communication Technology Policy

ICT4AD - Information Communication Technology for Accelerated Development

R&D - Research and Development

NaCCA - National Council for Curriculum and Assessment

JHS - Junior High Schools

SHS - Senior High School

SMS - Short Message System

TPACK - Technology Pedagogical and Content Knowledge

TAM - Technology Acceptance Model

Introduction

Information and Communication Technology (ICT) is increasingly recognized as a powerful tool of transformation within the educational system across the globe according to policy and research (Kozma & Isaacs, 2011; Mhlongo et al., 2023). As the world progresses into an increasingly digital age the incorporation of ICT in our educational system has become paramount, as it impacts student engagement, pedagogical practice, and educational outcomes (Boateng, 2023). The integration of ICT into the curriculum has gained immense prominence, with the possibility of enhancing learning experiences and teaching (Boateng, 2023; Comi et al., 2017; Grassini, 2023). Though many African countries have made some gains with the introduction of ICT in their educational systems, disparities still exist from country to country (Olanrewaju et al., 2021). Some education and ICT scholars hold the view that, in emerging economies, like those in sub-Saharan Africa, the integration of ICT in the educational curriculum has not been so commendable (Comi et al., 2017; Ponelis & Holmner, 2015a; Tilya, 2018). As a result, many African countries have begun to employ ICT in classrooms in many ways to enhance teaching and learning (Boateng, 2023; Josephs, 2018). This change has greatly led to the acceptance of a new standards-based curriculum (SBC) for teaching and learning in the educational systems in Africa (Apau, 2021). SBC aligns content and learning objectives with set standards guiding teaching and assessment. It is intended to shape teaching in line with established standards, ensuring quality and consistency in education (George et al., 2021). The former had issues with subject overload, students being prepared for exams at the expense of learning critical skills for human capital development, and the evaluation system's incapacity to enhance instruction (Apau,2021).

Similar studies by Msafiri et al. (2023) and Teidla-Kunitsõn et al. (2023) from the perspective of other developing countries in the global north have highlighted the challenges and benefits of using ICT in the classroom. Yalley (2022) also discovered a shortage of ICT facilities in secondary schools in Ghana, limited exposure of teachers and students to ICT, inadequate infrastructure, excessive costs, and a lack of funding. Similarly, Mwapwele et al. (2019) identified a lack of ICT resources in rural secondary schools in South Africa, significantly impacting teachers' capacities to integrate ICT into curriculum-related activities. Based on the above, the present study will be based on the case of Ghana education, and how the current ICT is implemented as a teaching aid in the current SBC and perceived by teachers.

In Ghana, several studies have explored the issue of ICT resources and teacher skills in educational contexts, shedding light on the associated obstacles and potentials (Baako & Abroampa, 2024). Abedi et al. (2024) investigated the use of ICT by secondary school students in Ghana and discovered that students mostly used ICT for communication rather than for learning purposes. Another study by Buabeng-Andoh & Issifu (2015) uncovered differences in ICT use between public and private schools and urban, semi-urban, and rural schools.

1.1 Background to the Study

Ghana's government is committed to providing its citizens with a quality, equitable, and accessible education (Swanzy et al., 2019). This dedication is obvious from the number of policy measures developed by the Ministry of Education during the last decade. One of these strategic policy initiatives is the ICT in Education Policy (Yidana & Aboagye, 2018). The formulation of Ghana's National Information Communication Technology Policy (NICTP) began in 2003 in response to a perceived lack of guidance on ICT (Odongo, 2012). In 2001 an educational reform committee was formed by the government to come out with a new curriculum for basic schools in Ghana. One major recommendation of the committee was to ensure that all students in pre-tertiary institutions in Ghana acquire basic ICT literacy skills, including internet use, and apply this not only in their studies but also in a variety of ways in their everyday life activities (Odongo, 2012; Yidana & Aboagye, 2018). This initiative led to the first drafting of the policy documents in 2003 which was commenced by extensive

consultations with education managers, ICT experts, and other stakeholders with diverse experiences across the country to identify national priorities. The new curriculum led to the formulation of Ghana's Information Communication Technology for Accelerated Development (ICT4AD) framework in 2001 and subsequent publication of the policy document, action plans, and legislation (Demuyakor, 2021; Yidana and Aboagye, 2018).

In designing this policy framework, the government recognizes the importance of ICT integration and how it would result in new possibilities for learners and teachers to engage in new modes of information acquisition and analysis, helping to improve Ghana's economy (Adarkwah & Huang, 2023). As a result, the policy document serves as a foundation to begin a systematic ICT in education delivery to guarantee the government's efforts to deliver on the three pillars: ICT as a learning and operating tool, ICT as integrated into the teaching and learning, and ICT as a career option for students (Abedi et al., 2024; Adarkwah & Huang, 2023). The national strategy envisions opportunities to simultaneously target the development of the ICT sector and industry, while also using ICTs as a broad-based enabler of developmental goals, with a focus on the development, deployment, and exploitation of ICTs to aid the development of all other sectors of the economy (Abedi et al., 2024; Adarkwah & Huang, 2023; Boateng, 2023; Demuyakor, 2021). The NICTP was vital for guiding Ghana's ICT growth. According to Odongo (2012) and Yidana & Aboagye (2018), the NICTP development was a four-step procedure, which stipulated the following roadmap for ICT inclusion in the national development agenda to create an enabling environment for the deployment, utilization, and exploitation of ICTs, to support the development of a knowledge-based ICT industry, to modernize the agricultural sector, to develop a competitive high-value-added services sector, to develop a national human resource capacity and Research and Development (R&D) capabilities, and to promote an ICT-enabled educational system. The NICTP was accepted and published in 2005, marking the first phase (Adarkwah & Huang, 2023; Odongo, 2012; Yidana & Aboagye, 2018). The NICTP was published under the implementation plan established throughout the ICT policy formulation process. This initial policy implementation process encountered several problems, reducing the phase's effectiveness in meeting the objectives. Some of the issues faced are that: Ghana has a younger population under 25, a high rate of illiteracy and primary school dropout, and nearly below-average of the Ghanaians live below the poverty line. Recognizing that the socioeconomic problems and challenges the country faces will be exacerbated by the new challenges posed by globalization and the information age, thus saw the need to review the policy in 2006 and 2008 to address the observed weaknesses and challenges in the ICT policy (Adarkwah & Huang, 2023; Buabeng-Andoh & Issifu, 2015).

In 2009, the Minister for Education issued an updated National ICT in Education Policy to foster advancement in information and computer technology, necessitating a revision of the policy to reflect the current situation (Abedi et al., 2024; Yidana & Aboagye, 2018). This amended policy is thus intended to catalyze change, propelling the resurrection of the Ghanaian educational sector and bringing it to a very contemporary, dynamic sector (Adarkwah & Huang, 2023). This updated document, aimed to bring Ghana's ICT in Education Policy to a new state of relevance and currency, while also ensuring its implementation sustainability, recognizes the key issues encountered since 2009, takes lessons from the successes, challenges, and failures of all relevant aspects of the policy, and considers the rapidly changing ICT landscape globally and offers specific prescriptive policy directives in a framework that should be seen embraced as workable and implementable by all stakeholders (Abedi et al., 2024; Apau, 2021; Baako & Abroampa, 2024; Boateng, 2023).

However, the government's ambition to turn Ghana into an ICT-literate society has been delayed due to unresolved foundational challenges. The ICT4AD strategy was initially intended to last 20 years with the expectation of significant ICT development by the end of 2022, prompting a policy reform (Msafiri et al., 2023). As of 2020, there is no update on the ICT4AD (Kubuga et al., 2021). According to the National Council for Curriculum and Assessment (NaCCA), the latest standard-based curriculum emphasized the integration of ICT in education to facilitate effective teaching, learning,

and management through the provision of computer labs, internet, and network connectivity to schools, supply of laptops to teachers and students, and capacity development of teachers (Agbofa et al., 2023). To achieve this new educational paradigm, the government through the support of multi-national organizations like the World Bank and the International Monitory Fund invested millions of USD in providing computer laboratories, internet connectivity, and network infrastructure, as well as equipping teachers and students with laptops and improving teachers' ICT skills (Grassini, 2023; Kubuga et al., 2021). These findings collectively emphasize the urgent need for developing countries to create a holistic approach to address the barriers inhibiting ICT utilization in educational settings. Studies exist for the integration of ICT into education, particularly ICT as a subject of its own or its integration into specific subjects like mathematics and science in various countries including Ghana, however, there is a notable gap in research focusing on ICT as a pedagogical tool across all subjects (Boateng, 2023; Buabeng-Andoh & Issifu, 2015; Ponelis & Holmner, 2015a).

This study, therefore, seeks to address this gap by assessing the implementation of ICT as a pedagogical tool in the SBC from the perspective of Junior High Schools (JHS) in Ghana. The justification for sampling JHS is the reduction in budgetary allocation for basic schools due to the introduction of the Free Senior High School (SHS) program in 2017. Since the Free SHS policy was introduced in 2017, it now receives much of the government's investment especially the availability of resources for ICT implementation as a pedagogical tool and to assess teacher development, to the detriment of basic schools (Adamba, 2023).

1.2 Problem statement

ICT has become a cornerstone of education in the 21st century in many developing countries including Ghana (Odongo, 2012). The rapid penetration of digital technologies across the country alongside the simultaneous adoption, use, and integration of these technological tools in advancing teaching and learning at all levels of the ladder facilitates positive outcomes (Adarkwah & Huang, 2023). In the information age access to the internet potentially exposes teachers and learners to different pedagogical tools to reflect global educational best practices (Haleem et al., 2022).

Similarly, researchers contend that ICT improves classroom management by making pupils more well-behaved and focused. Also, Kerimbayev et al. (2023) argued that ICT can help create a learner-centered teaching environment by actively including learners in the learning process. Moreover, ICT promotes active and engaging lessons for the best learning experience. According to Vargas-Montoya et al. (2023), most teachers stated that the use of ICT allows students to be more active and engaged in the lesson, indicating that both teachers and students agreed that ICT enables students to be more proactive and take on more parts or roles for a better learning experience.

Like many technologies throughout history, ICT has been described as having many positive effects, however, it is crucial to understand that it will also unavoidably bring a distinct set of issues and challenges. Many drawbacks of using ICT to teach writing skills are mentioned (Yunus et al., 2013). Respondents of the study stated that students frequently used abbreviated forms, or the "SMS language," like how they do in the short message system (SMS). Teachers also lose precious time due to technical issues that arise frequently. Additionally, if ICT is misused input delivery may be restricted, increasing the chance that students won't comprehend what their lecturers are attempting to teach them.

Also, Liutynska et al. (2020) mentioned the following issues related to the use of ICT: a lack of personal gadgets by many teachers and students; an abundance of teachers and a lack of digital literacy; difficulty incorporating ICT into lesson plans; and a lack of direct interaction between those involved in the educational process when using ICT.

In conclusion, ICT can nurture students' potential, and the skills teachers need to participate effectively in the digital age (Haleem et al., 2022; Val & López-Bueno, 2024). ICT can engage teachers and

students in the teaching and learning process, preparing them for life in the digital age. ICT eliminates barriers of time and space, making education more flexible. It also promulgates critical thinking, creativity, and innovation among students, while providing easy access to information (Agbofa et al., 2023). However, ICT could also face some implementation challenges if the requisite resources are not readily available. The risk of teachers losing out is imminent when the required financial and logistical resources are not provided at the right time (Mochiah & Adibi, 2023b).

Examining the literature on ICT, several scholars and studies suggested that ICT for SBC implementation in developing countries has not adequately been addressed, especially from the perspective of implementation, access, resource availability, teacher development, effectiveness, and constraints. This is especially true of Ghana. Based on the deficiencies identified in ICT for SBC in educational systems and the knowledge gaps identified in the forgone extensive discussions. The following research questions guide this study.

1.3 Research Questions

This study aims to explore and evaluate the implementation of SBC in Ghanaian JHS emphasizing, the integration of ICT as a pedagogical tool. By addressing key research questions such as:

RQ 1: What technological tools are available for implementing ICT as a pedagogical tool in Ghanaian JHS?

RQ 2: How do teachers perceive their level of readiness and ICT skills concerning the implementation of the SBC?

RQ 3: Are teachers perceiving ICT for SBC as effective for enhancing teaching and learning experiences?

RQ 4: What are the challenges of implementing/integrating ICT in an SBC for teaching and learning in Ghanaian JHS?

1.4 Significance of the study

This study will explore and evaluate the implementation of the SBC in Ghanaian JHS, with a particular focus on the integration of ICT as a pedagogical tool within the Kumasi Metropolis in the Ashanti Region of Ghana, to provide a comprehensive understanding of the current state of ICT in Ghanaian JHS.

Governments in developing countries generally lack the requisite financial resources and the infrastructure for effective implementation of ICT in the SBC. This study on the implementation of ICT in the SBC is expected to benefit academia, policymakers, and educational institutions. This study adds to academic discourse and opens future research on how the deployment of ICT can foster innovation and enhance stakeholders' interest in the successful implementation of SBC in educational systems. The present research has also added to a list of literature on ICT for SBC in less studied continents like Africa, thereby increasing public knowledge and adding to the limited literature on ICT for SBC within academia.

The findings of this study could provide vital information to make input and inform government policies and strategies on the issue of the application of ICT for SBC, promotions, and education in Ghana, and beyond. Again, this study further provides the government alternatives and platforms to review existing policies on social media and public health communication campaigns, education, and promotions. Therefore, the outcome of this research could guide future governments to understand the effectiveness of ICT implementation for the successful implementation of the SBC in JHS, and how it could help propel Ghana and other developing countries into the third industry revolution. Also, the findings of this study are useful for policymakers and stakeholders, particularly in developing

economies like Ghana to see the need to fast-track the adoption of ICT in the education sector, especially when it comes to SBC implementation in basic schools.

Educational institutions, especially the basic schools in developing countries, would use the findings in this study as reference material to conduct further research into the issue of spatial inequality in the digital divide, particularly ICT-based curriculum implementation in Ghana, and other developing nations of the globe. The findings of this study can aid in improving the ICT infrastructure and teacher skills development for effective teaching and learning by more efficient resource distribution and ensuring that investments align with the actual needs of basic schools.

1.5 Scope and Limitations of the Study

Conceptually, the study will focus on examining the available technological resources for ICT implementation and assess teachers' perceptions of their skills and resources for ICT integration in teaching and learning practices, thus the effectiveness of ICT utilization in enhancing teaching and learning experiences from the perspectives of Head Teachers and Classroom Teachers from six selected JHS in Ghana. Geographically, the study will focus on the Kumasi Metropolis in the Ashanti Region of Ghana.

Literature Review

A systematic review methodology was used to collect articles for this study. Three key features were considered in reviewing the literature. Jesson & Lacey (2006) identified the first feature as a rule-driven and vigorous search process, compared to a regular literature review, ensuring an explicit statement of the criteria used to select articles to avoid bias in their selection, the second concerns about using a transparent procedure for data collection and quality assessment, while the third emphasizing a comprehensive understanding of each study.

Much importance was placed on the review procedures to enable credibility, timeliness, language, and selection of search terms, phrases, and articles. The processes employed ensured relevant articles were selected to address the research questions and provide insight into the topic under study. 4000 articles were found based on the words and phrases searched. 107 articles were selected concerning the research questions.

Regarding the literature, credibility was ensured by using peer-reviewed articles published in journals, academic books, and authoritative websites. A systematic analysis was also employed to identify relevant literature on research databases such as Google Scholar, Scopus, Eric, LearnTechLib, SCISPACE, Science Direct, and Sage. The study included articles published only in the English language. Initially, the study focused on articles published from 2013 onward, but it became necessary to include older yet relevant articles to guarantee a comprehensive understanding of the topic. To effectively search for relevant articles key terms such as 'ICT policy in Ghana,' 'challenges of ICT implementation/integration,' 'ICT tools/resources,' and 'teachers' perception of ICT integration' were used. Articles were first selected based on their relevance to the topic and ICT in education, after thoroughly reading the abstracts and findings, those that aligned with the study's themes were selected for comprehensive reading.

The study's literature review discusses the relevant themes of the study. The section is divided into five (5) subsections on the gaps identified in the problem statement and the study objectives.

2.1 Resources for ICT Teaching and Learning

The procurement and distribution of the appropriate and key ICT tools is a prerequisite for implementing ICT at all levels of education. Providing the necessary technological resources in the various schools potentially promotes effective, efficient, and enhanced teaching and learning. Scholars have recommended various technological tools for implementing a successful ICT for teaching and learning. Key tools include computers, laptops, LCDs, digital photocopy machines, digital audio and video devices, digital cameras, educational platforms, software, scanners, DVD players, and multimedia projectors (Adarkwah & Huang, 2023; Comi et al., 2017). These tools serve different purposes, enhancing teaching and learning processes (Kumar, 2023).

For instance, Apau, Stephen (2021); Kumar (2023) and Val & López-Bueno (2024) highlighted the importance of devices such as desktop and handheld computers, digital cameras, and networking technologies (e.g., LAN and Internet). They also emphasize the role of educational applications like word processors, spreadsheets, tutorials, simulations, email, digital libraries, and videoconferencing in supporting educational activities.

In addition, studies by Kaur (2023); Adamba (2023); Buabeng-Andoh & Issifu (2015) and Haleem et al. (2022) identified ICT tools that foster literacy and language development. These include multi-link headphones, webcams, audio recording software, and interactive whiteboards, which promote writing skills and enhance listening and speaking abilities.

Furthermore, various online services such as search engines, email, e-libraries, e-journals, social websites, and e-learning portals are noted for their effectiveness in teaching (Adarkwah & Huang, 2023; Kumar, 2023).

Comi et al. (2017) provided an extensive inventory list of ICT resources available in schools including computer laboratories, internet facilities, satellite technology, projectors, public address systems, interactive boards, and maintenance workshops. Similarly, Babah et al. (2020) and Tsapali et al. (2021) explore the availability of technological resources in schools, identifying items like computers, radios, digital cameras, electronic whiteboards, and creativity software**.**

In summary, ICT tools are essential for effective teaching and learning outcomes. Various tools such as computers, digital cameras, interactive whiteboards, and educational software play crucial roles in this process. Additionally, successfully implementing these tools requires important skills and knowledge from educators and students.

2.2 Teachers' Perceived Skills for ICT Implementation

Teachers' knowledge and skills in ICT at all levels of education are crucial for implementing and integrating ICT resources in their teaching and learning (Apau, 2021). Their level of knowledge and skills can impact their adoption of ICT resources in the classroom. Abedi et al. (2024) and Agbofa et al. (2023) investigated teachers' perceptions of computers for teaching and learning. The study revealed that few teachers used computers for teaching and learning purposes, while most used computers for administrative purposes. Also, Abedi et al. (2024) discovered that many teachers expressed limited confidence in using technology to aid specific concepts or skills development and support teaching and learning. In the same vein, the study by Hennessy et al. (2022) and Nilseng et al. (2014) noted that the first ICT integration in Tanzania schools was a pilot study, and much was expected from most teachers to use technology to support the teaching and learning process. The findings, however, showed high standard deviations in most of the technology use indicating that within the school, some teachers perceived their technology integration competency as high while others perceived it as low.

Minga & Ghosh (2024) studied pupils' and teachers' perceptions towards ICT use in teaching and learning Mathematics in selected secondary schools in Zambia and echoed similar findings. The study's findings revealed that 64% of the teachers did not feel competent teaching mathematics and communicating with pupils using ICTs', only 30% felt competent and 6% were neutral indicating that a significant proportion of teachers lack teaching with ICT.

Alomari (2023) argued that teachers' perceptions toward their computer applications and network domain competencies were average. This finding is mirrored by Baytar et al. (2023) who reported that 31.5 % of the individuals who participated in their research do not feel competent at all in ICT usage, while 26.1% feel effectively competent. This is to say that a considerable percentage of the participants lacked confidence in ICT usage. Moreover, researchers such as Pasaribu et al. (2023) and Santosa et al. (2022) highlighted that teachers have positive perceptions towards ICT integration in teaching the English Language and that they could use YouTube, Google, and PowerPoint presentations but lack the skills for designing tasks, making classrooms interactive, and managing the class effectively.

On the contrary, Waiganjo (2021) researched teachers' perceptions and use of ICT in teaching and learning in Namibia. This revealed that teachers have a positive perception of ICT integration in teaching and learning and are skilled in integrating different types of technologies efficiently to have an interactive classroom, indicating a high level of ICT skills among the teachers. A similar study by Buabeng-Andoh & Issifu (2015) suggested that most teachers perceived their level of competency as moderate in basic ICT knowledge.

The level of ICT skills in teaching and learning among teachers highlighted those teachers demonstrated high skills in integrating technology to promulgate student-centered learning experiences, developing instructional resources that aligned with curricular requirements, and employing creative teaching depending on the context of the school and learners' needs (Adamba, 2023; Nilseng et al., 2014; Nyakito et al., 2021). Additionally, teachers showed adeptness in integrating multimedia tools and resources to create dynamic and engaging learning experiences, facilitating collaborative learning and communication among students, and utilizing data to enhance instruction and improve learning outcomes (Singh, 2023).

The literature reviewed shows that teachers' ICT knowledge and skills significantly impact the integration of ICT in education. Research indicates varying levels of ICT competency among teachers, with many underprepared to use technology effectively in teaching. Despite general positive perceptions toward ICT and its effectiveness, teachers lack confidence and skills for effective ICT integration in the classroom.

2.3 The Effectiveness of ICT for Teaching and Learning

Many countries in the developing world failed to adopt technology in the first, second, and third industrial revolutions, resulting in underdevelopment (Abdulrahaman et al., 2020; Abedi et al., 2024). It, however, is interesting to acknowledge that, many developing nations have now resorted to ICT to enable them to participate in the 4th industry revolution. To achieve the full gains of the 4th industry revolution many developing countries have integrated ICT in their curriculum in all levels of education. ICT is seen as a tool for knowledge transfer and to help prepare current students, especially those in basic schools to become tech-savvy (Baako & Abroampa, 2024; Buabeng-Andoh & Issifu, 2015). The transformation required for the growth and prosperity of many developing nations depends on integrating ICT into the standard-based curricula of many schools. Within the era of information society, where information, communication, and technology are a key driver of increased productivity, the use of computer-based tools and instructional processes (Agbofa et al., 2023; Hennessy et al., 2022).

Similarly, a study by Sharma & Srivastava (2019) shows that ICT in teaching and learning can motivate students' levels of participation in classroom activities. They also like to use the computer to access students' results and keep track of their progress. Sentence & Csizmadia (2017) and Yidana & Aboagye (2018) also discovered that learning about areas of the curriculum that students might normally find difficult and where a particular use of ICT could enhance learning is vital. The idea is to use ICT readily available in schools and yet underutilized, for example, word and drop-down menus in modern foreign languages, the Oxford Educational Dictionary online in English, and graph-plotting software in mathematics.

ICT integration in the classroom for teaching and learning fosters collaborative learning while nurturing transversal skills that promote social, problem-solving, self-reliance, responsibility, and the capacity for reflection and initiative among students, lecturers, and students, and lecturers (Abedi et al., 2024; Agbofa et al., 2023). These characteristics are essential principles that students must acquire in an active teaching and learning environment (Alomari, 2023). Other studies by Babah et al. (2020); Grassini (2023) and Haleem et al. (2022), suggest that using ICT tools and resources in the classroom creates a more engaging and effective learning environment for teachers and students.

A study by Buabeng-Andoh & Issifu (2015) on secondary school teachers' perspectives on ICT usage in Gana revealed low perceived ICT usage, access, training, and competence among teachers. The study also found gender variations in confidence and administrative assistance and no significant differences in access, support, self-efficacy, competencies, and training between public and private school teachers. Moreover, according to Kozma & Isaacs (2011), employing ICT for teaching and learning is crucial in offering students access to relevant information, and efficient tools for accommodating individual differences, including those with special needs.

In conclusion, ICT in education aims to prepare students to be tech-savvy, fostering skills like problem-solving and collaboration, which are essential for development. Despite the positive impacts of ICT in education, it is important to highlight the challenges faced when implementing it in the classroom. Studies reveal low ICT usage and competence among teachers, underscoring the need for better training and support.

2.4 Challenges of implementing/integrating ICT in education

What are the challenges of implementing ICT in education? It's essential to acknowledge that challenges transcend borders, affecting developing and developed countries. These challenges shared across diverse contexts are listed below.

2.4.1 Lack of teacher confidence and belief

Several researchers have shown a major barrier that prevents teachers from utilizing ICT in their classrooms is a lack of confidence. Ghavifekr & Rosdy (2015) studies show that the acceptance of ICT by teachers and students within and outside the classroom whereby both are more likely to use technologies, was found that the lack of confidence was a barrier that reduced the percentage of ICT integration in the classrooms (Ghavifekr & Rosdy, 2015). This is consistent with Ampofo et al., (2020) findings. Researchers have tried to study and analyze the factors affecting ICT use in the classroom (Capan, 2012; Virkus, 2008; Zhang, 2013; Dudeney, 2010). The result shows that the major barrier to the implementation was teachers' belief that teachers are the persons who implement the change in their teaching and learning process. Moreover, previous research (Cassim & Obono, 2011) shows a high correlation between teachers' beliefs and ICT use. Teachers' role is getting more important, especially utilizing ICT in pedagogy which could increase students' achievement, creativity, and thinking skills.

2.4.2 Limited time

According to Ainoo & Amartey (2021), time constraints in using ICT resources are a contributing factor hindering effective ICT usage in teaching and learning, this assumption was agreed by 87.18% of the respondents of the study. A study by Asianoa et al., (2022), and one by Sokku & Anwar (2019), shows that lack of time is an important factor affecting the application of ICT tools in science education. Lack of time, according to the authors, is a barrier affecting the application of ICT due to busy schedules. Kumar (2023) and Moses et al., (2022) supported the idea that educators don't want to spend time setting up computers and projectors during class time. Likewise, Agyei & Voogt (2011) study revealed that teachers take much more time to design projects that include the use of ICT than in comparison to traditional lessons. A participant from Sicilia's study commented that the constraints of diverse class schedules contributed to the lack of time spent on work on planning classroom activities. Moreover, Ampofo et al. (2020) posited that the inaccessibility of computers in schools remains one of the major challenges teachers in basic schools are confronted with incorporating ICT in their classes. Again, Maas et al. (2021), point out that teachers face the problem of a lack of time in numerous facets of their profession, which impacts their capacity to finish tasks, with some of the participating teachers stating which aspects of ICT demand more time. These consist of the time required to get internet guidance, plan instruction, investigate and practice utilizing technology, troubleshoot technological issues, and acquire appropriate training. Additionally, Nyakito et al. (2021), also concluded that one of the main reasons that science teachers fail to utilize ICT in the classroom is the lack of time needed to accomplish plans.

Ampofo et al. (2020) investigated how incorporating ICT into teaching and learning in junior high schools in Ajumako-Ghana observed that lack of time for computer usage, as well as timetable constraints, contribute to the challenges of teachers in the basic schools in Ajumako to integrate ICT in their teaching and learning practices.

2.4.3 Lack of effective training

Nkengbeza et al. (2022) studies contend that teachers in Namibia's primary schools lack proper training, which makes them rarely incorporate ICT in their teaching and learning activities. Beggs (2000) studies found that lack of training is one of the top three hurdles to teachers' use of ICT in teaching. According to Khan and Kuddus (2020), inadequate teacher training still exists and insufficient training for the teachers will influence their teaching practices when utilizing technology. Recent studies in Turkey indicated that low in-service teacher training in ICT use as well as limited teacher training in ICT use in schools is a major barrier to using new technologies in education (Özden, 2007; Toprakci, 2006).

Becta (2004) argues that training is a complicated topic requiring several effective components. Initial teacher training included time for training, pedagogical training, skill development, and ICT integration. Correspondingly, Gomes's (2005) studies found that teachers face barriers to using new technologies in the classroom due to a lack of digital literacy, pedagogic and didactic training, and technology use in specific subjects.

According to Ngwu (2014) deficiency in professional development opportunities also contributes significantly to the barriers to effective utilization of ICT resources in teaching-learning. Similarly, Ampofo et al. (2020) contended that the lack of training in utilizing computers and other ICTs poses a challenge in incorporating ICT in basic schools in Ajumako-Ghana.

2.4.4 Limited Technical Support

According to Becta's (2004) studies, many teachers are hesitant to utilize ICT in the classroom due to technical issues, including equipment breakdowns during lessons. Waiganjo (2021) reported lack of IT technicians to help with repairs of damaged devices is a contributing factor to ICT integration in class. Likewise, as reported by Agbofa et al. (2023); Agyei & Voogt, (2011); Ampofo et al., (2020) in providing schools with hardware and internet connections, it is important to give technical help for repairs and maintenance to ensure continuing usage of ICT in schools. Teachers may feel discouraged and unwilling to integrate ICT into their instructional activities without adequate technical support. Similarly, Raman & Yamat (2014) agreed that an absence of technical support discourages teachers from accepting and incorporating technology (ICT) in their classrooms.

2.4.5 Lack of Access to ICT Tools/Resources

Hennessy et al. (2022); Kozma & Isaacs (2011) and Kumar (2023) identified that the greatest barrier to using ICT in schools is limited access to ICT resources. Access to ICT infrastructure in schools is essential for integrating technology into education. Adoption and integration of ICT rely on the availability and accessibility of resources like hardware and software. This is consistent with Mwapwele et al. (2019) and Nkengbeza et al.'s (2022) findings that the problem of accessibility to existing hardware (computers, projectors, etc) hinders the effectiveness of ICT utilization in teaching and learning.

A survey conducted by Natia & Al-Hassan (2015) in 628 schools revealed that 3,217 computers are provided for pedagogical, and administration use to a population of over 100,000 pupils. The learner-to-computer ratio is about 189 pupils chasing every single computer. The result shows that computers are inadequate in primary school which suggests that pupils face challenges accessing ICT tools for their learning (Natia & Al-Hassan, 2015). Aikins & Arthur-Nyarko (2019) review noted a similar trend in Ghana and other African nations showing that limited access to ICT contributes to a lower usage of ICT in education.

Moreover, Al-Awidi & Ismail's (2014) research identifies the primary barrier to integrating ICT into the teaching of English as a lack of appropriate media technology resources and tools. Sufficient technological convenience is essential for students to study English effectively. This statement is echoed by Muslem et al. (2018), who reported that ICT integration hurdles include limited ICT gadgets and sluggish internet connectivity. Moreover, Ampofo et al., (2020) posited that

inaccessibility of computers in schools remains one of the major challenges teachers in basic schools' face in incorporating ICT in their class. Vatanartiran & Karadeniz (2015) reported that some teachers had either no technology or an insufficient supply of technology for teaching in the classroom. The technologies they referred to include sound systems, printers or Xeros, smart boards, projectors, and desktop computers.

2.4.6 Lack of Teachers' Competency/ICT Knowledge

Teacher competence is another aspect impacting their ability to integrate ICT into their teaching practices (Becta, 2004). According to Hajikaleng (2020), some teachers still have limited knowledge of ICT. Teachers' lack of expertise in ICT has an impact on their role as teachers to teach. Okunade study (2002) revealed that many teachers lack computer skills and are hesitant to include extra learning in their methods of instruction. The study indicates that the amount of this barrier varies by nation.

Research indicates that teachers in underdeveloped countries have significant barriers to adopting ICT due to a lack of technological expertise (Pelgrum, 2001). In Syria, teachers' lack of technical skills has been identified as a major hurdle (Albirini, 2006). Waiganjo & Paxula's (2020) study in Namibia points out that teachers' and students' lack of ICT skills and knowledge is a major challenge they are confronted with in integrating ICT into their lessons. Similarly, in Saudi Arabia, an absence of ICT skills hinders the incorporation of technology in science education (Al-Alwani, 2005). Bhandari (2020) argues that a lack of knowledge and skills in using ICT prevents teachers from incorporating ICT in their teaching to address students' interests in Nepal. Amenyedzi et al. (2011) also added that Ghanaian teachers' lack of knowledge and skills in ICT is a serious challenge in integrating ICT in the classroom.

Challenges persist in developed countries as well. For instance, Empirica (2006) report on ICT use in European schools exemplifies these shared obstacles. The paper uses data from the Head Teachers and Classroom Teachers Survey, conducted in 27 European nations. The result revealed that teachers who do not utilize computers in the classroom often cite "lack of skills" as a barrier to adopting ICT for instruction. Pelgrum studies (2001) revealed that teachers' lack of knowledge and abilities is a significant barrier to the integration of ICT in elementary and secondary education. Balanskat et al. (2006) research findings showed that many teachers in Denmark choose not to use ICT and media in teaching due to a lack of ICT skills, rather than for pedagogical or didactic reasons. In the Netherlands, however, teachers' ICT knowledge and skills are no longer considered the main barrier to ICT use. Lack of teacher competence as a result may be a significant impediment to integrating technology into education. It may also play a role in reluctance to change. Also, the case study result of Balanskat et al. (2006) and Pelgrum (2001) reveals that lack of knowledge and skills among teachers serve as a barrier to utilizing ICT in education.

2.4.7 Complexity of Integrating ICT

Integrating ICT into teaching and learning is complex, especially when combined with other internal applications. This might hinder teachers from adopting and integrating ICT effectively. The case study found that many instructors lack the necessary abilities and expertise to integrate ICT into their instructional activities. Pelgrum (2001) identified difficulties in integrating ICT-based education as barriers to teaching and learning. This is comparable to the findings of Vatanartiran & Karadeniz (2015). They argued that teacher competencies are characterized by technology pedagogical and content knowledge (TPACK). They added that when it comes to TPACK, teachers are unsure how to engage students in activities and manage the classroom when employing technology.

Research repeatedly shows that complexity hinders innovation acceptance and makes integration, implementation, and dissemination more challenging (Frambach, 1993; Rogers, 1995/2003). Rogers (1995/2003) concluded that complexity was adversely associated with the rate of ICT adoption.

In summary, implementing ICT in education requires providing key technological tools like computers and digital devices for teachers and learners, enhancing teaching and learning. Teacher proficiency in ICT skills is crucial for successful ICT integration, though the reviewed literature shows that many educators feel inadequately prepared despite having positive attitudes toward technology. Challenges such as lack of confidence, limited time, insufficient training, inadequate technical support, and restricted access to resources impede effective ICT use. Hence, I have chosen the Technology Acceptance Model (TAM) to provide a framework to analyze the factors affecting ICT acceptance in education. The TAM, proposed by Davis (1989), suggests that perceived usefulness and ease of use determine individuals' acceptance and use of technology. It helps to systematically understand how perceived usefulness, ease of use, and external variables influence teachers' attitudes and intentions toward using ICT. Therefore, TAM is a suitable theoretical framework for this study as it can effectively guide the investigation of the factors influencing ICT integration in educational settings. Further discussion on TAM will be extensively covered in the next section.

Existing literature on ICT adoption in curriculum implementation has used TAM to understand implementers' acceptance and use of ICT tools. Various studies have investigated the factors influencing the adoption of ICT in institutions, such as teachers' and lecturers' perceived usefulness and ease of use. Edmunds et al. (2012) applied the TAM to examine workers' attitudes towards using ICT tools in higher educational institutions. The findings revealed that lecturers who perceived ICT and digital tools as useful and easy to use are likely to accept and adopt such tools. The findings of this study highlight the relevance of the TAM in understanding the factors that drive lecturers' acceptance of ICT tools in education (Davis et al., 1989).

Theoretical Framework

The theoretical section here explores the key theoretical framework and concepts that will be used to analyze the incorporation of ICT in SBC in JHS in Ghana. It provides a theoretical foundation for understanding the role of ICT in an SBC in Ghanaian JHS. Based on the focus of the study, I have found the Technology Acceptance Model (TAM) ideal and relevant for understanding the adoption of ICT in the implementation of SBC in Ghanaian JHS.

3.1Technology Acceptance Model (TAM):

TAM is recognized as the ideal model for understanding the acceptance, and use of new technologies such as ICT tools by individuals and institutions (Davis, 1989). The TAM posits that perceived usefulness and ease of use are key determinants of users' attitudes and intentions toward adopting a technology. In the context of this study, the TAM can provide insights into how institutions and teachers perceive and accept the integration of ICT tools in the implementation of the SBC (Davis, 1989). In the context of ICT in an SBC, TAM provides a framework to understand implementers' attitudes and intentions toward accepting ICT tools (Davis, et al., 1989). Davis (1989) proposed six variables that influence or determine the levels of acceptance and use of technology. For this study, two key factors of the model are relevant: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which individuals believe technology will enhance their job performance or make their work more efficient. In the context of ICT in an SBC, teachers may perceive ICT tools as useful if they can improve teaching and learning outcomes. By assessing implementers' (teachers) perceptions of ICT usefulness, the study can determine the potential impact of ICT on the implementation of SBC. Perceived ease of use describes the degree to which individuals believe a technology is effortless and user-friendly. If teachers perceive ICT tools as easy to use and integrate into their teaching and learning, they are more likely to adopt and accept them. Understanding teachers' perceptions of the ease of use of ICT tools is crucial for assessing the feasibility and potential barriers to SBC implementation.

By applying the Technology Acceptance Model (TAM), this study aims to gain insights into implementers' attitudes, intentions, and perceptions regarding the integration and utilization of ICT in curriculum implementation (Davis, 1989). TAM helps examine the factors influencing technology acceptance, guiding research design, data collection, and analysis to understand ICT's role in the SBC in Ghanaian JHS. While TAM provides a useful framework for understanding ICT adoption, it might not necessarily capture the specific challenges related to resources and context in Africa. Mtebe and Raisamo (2014), for example, studied how eLearning was adopted in Tanzanian universities and discovered that TAM did not adequately account for the challenges associated with poor infrastructure, restricted access to technology, and a lack of technical support which were significant adoption barriers.

The research questions in this study are informed and guided by the TAM as the theoretical framework. The first research question is, what technological tools are available for implementing ICT as a pedagogical tool in Ghanaian JHS? This is oriented toward understanding how access to technical tools affects the perceived ease of using ICT. The second research question is, how do teachers perceive their level of readiness and ICT skills concerning the implementation of the SBC? pertains to both perceived ease of use and perceived usefulness. The third research question is, do teachers perceive ICT for SBC as effective for enhancing teaching and learning experiences? This directly addresses perceived usefulness. Finally, the fourth research question asks: What are the challenges of implementing/integrating ICT in an SBC for teaching and learning in Ghanaian JHS? This also relates to perceived ease of use. Challenges such as inadequate infrastructure, insufficient training, and technical issues impact teachers' perceptions of ICT usage.

The TAM framework considers key factors like institutional variables (culture, structure) and teacher variables (perceptions, beliefs) that shape readiness and attitudes toward ICT (Adamba, 2023; Agyei

& Voogt, 2011; Alomari, 2023). This structure facilitates studying ICT adoption, implementation, and outcomes including teaching efficiency, knowledge sharing, and teacher satisfaction (Mwapwele et al., 2019). It also addresses mediating and moderating factors influencing ICT adoption in curriculum implementation. The TAM framework aids in understanding educators' ease of use and the perceived usefulness of ICT in their teaching and learning processes.

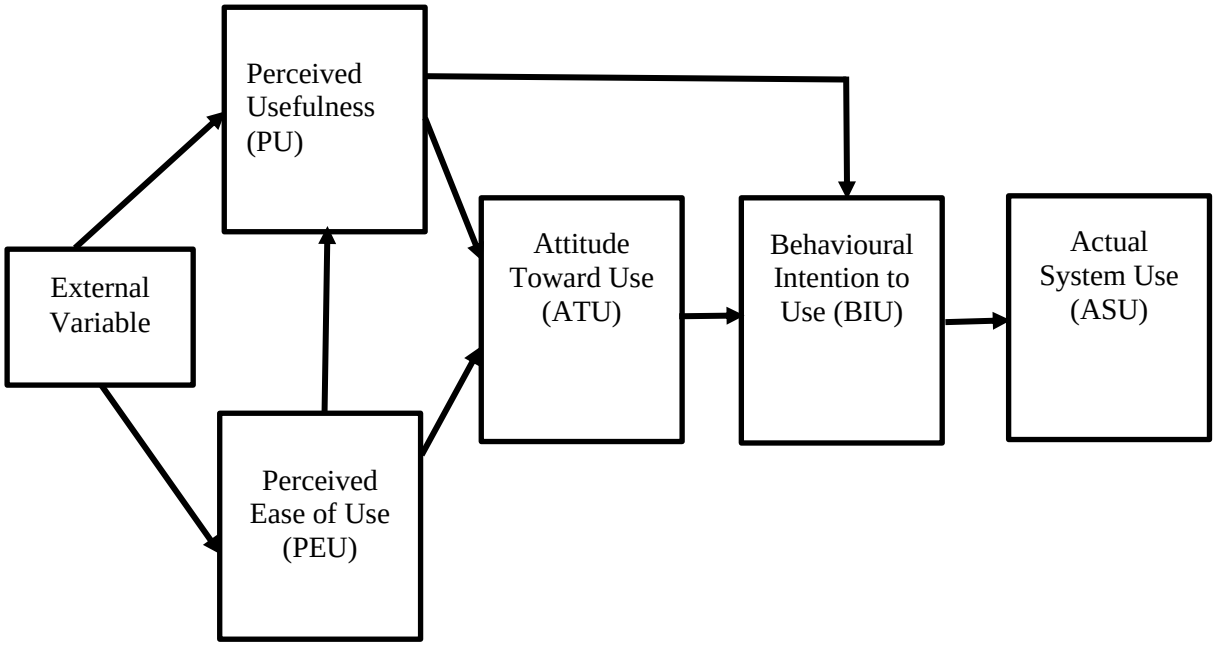

Figure1: The Technology Acceptance Model (TAM)

Research Methodology

In this section, the methodology that will be used for the study is discussed. The sub-sections will include the research approach, the research design, the population, the sampling procedure, the instrument for data collection, data processing and analysis, and issues on ethics.

4.1 Research Approach

A qualitative method was used in this study, to understand the level of resources available, teachers' readiness and perceived ICT skills for implementing ICT as a pedagogical tool, the effectiveness of ICT for enhancing teaching and learning as well as the challenges of implementing/integrating ICT in an SBC for teaching and learning in Ghanaian JHS. Qualitative approaches are not so polarized, categorical, dichotomous, or viewed rigidly; but rather just varying ends of a continuum-Qualitative approaches are flexible and not strict or divided into clear categories; instead, they fall along a spectrum with different degrees of variation (Busetto et al., 2020). It is emphasized by Creswell & Poth (2018) that studies tend to be more qualitative in approach. Previously, qualitative research approaches were distinguished based on data collection methods and instruments (Creswell, 2016). However, a more comprehensive model of viewing the gradations of differences between quantitative and qualitative is the basic philosophical assumptions researchers employ in their study, the research strategies, and the methods used in conducting the studies (Mosweu & Mosweu, 2020). Like research design, a researcher's choice of approach is based on the nature of the research problem or issue being addressed, the researchers' personal experiences, and the audiences for the study (Creswell & Poth, 2018; Mosweu & Mosweu, 2020). My background as a Ghanaian teacher for ten years and a facilitator of the new SBC played a critical role in shaping this study. As a teacher, I encountered significant challenges related to the lack of ICT implementation in Ghanaian classrooms. These firsthand experiences highlighted the gap between policy and practice in integrating technology into the educational system. This motivated me to investigate the underlying issues affecting ICT adoption in schools and to contribute to finding effective solutions. My deep understanding of the education landscape in Ghana, coupled with my professional experience, has provided me with valuable insights into the complexities of ICT implementation, guiding my research in this field.

4.2 Research Design

Creswell, J.W. & Creswell (2018) defined research design as the plans and procedure for decisions on general assumptions, that explain the methods for data collection, and analysis. It provides logical and systematic ways to find answers to the problem of the study. It serves as the blueprint for designs including data collection and analysis. I have chosen a qualitative interview method, and semi-structured interview questions were also used to gather information regarding the background of the participants, demographic information, and the general understanding of the participants about the ICT - SBC in Ghanaian JHS.

The interview guide (see Appendix 1) focuses on ICT resources for implementing SBC, teachers' readiness and perceived ICT skills, the effectiveness and utilization of ICT in enhancing teaching and learning experiences, and the challenges and factors affecting the implementation of ICT in this context. Busetto et al. (2020) and Creswell & Poth (2018) suggested that semi-structured questions are meant to get information from the participants on three main issues including participants' opinions on the subject matter, encourage two-way communication, and provide qualitative data to compare to previous and future data. Therefore, the semi-structured questions approach is ideal as it's an in-depth interview that provides rich information regarding the key questions of the study (Creswell, 2016; Teherani et al., 2015). This study interview was conducted via the Zoom video conferencing platform as the communication medium. Arrangements were made with the participating teachers to ensure suitable environments for the interview. During the interview, a list of items to elicit responses from the interviewees served as a guide for gathering in-depth information from the participating teachers.

This ensured that the voices of the teachers were heard, their unique perspectives were considered, and a comprehensive understanding of the research topic was achieved. The interaction was two-way communication, but the participant shared their opinion more while the researcher listened.

4.3 Research Population, Sample Size, Data Collection Methods, and Sampling Techniques

The research focused on public JHS teachers in the Ghana Education Service (GES), with a specific emphasis on professional teachers within the Kumasi Metropolitan area in the Ashanti Region. The study narrowed its target population to this geographical region to ensure a manageable scope. Among the schools located in the Kumasi Metropolitan area, a random sampling methodology was employed to select six schools to participate in the study. A total of ten (10) teachers and five (5) head teachers were purposively sampled to participate in this research (for the demographical characteristics of the participants, see Table 2).

Moreover, random sampling was employed to avoid any potential bias in selecting a specific school based on predetermined criteria maleficence (Cohen et al., 2011). However, the research participants were sampled purposively for the study (Cohen et al., 2011). The approach was carried out to include teachers with long experience in the teaching field (Cresswell & Plano Clark, 2018). Moreover, considering the number of subjects taught in the JHS, the method was adopted to select participants to represent different subjects being taught. These methodological strategies were employed to gather reliable and unbiased data that can provide meaningful insights into the experiences and perspectives of public teachers within the Ghana Education Service in the context of the Kumasi Metropolitan area.

The data collection method used for this study was an interview. An interview is essential to understand the phenomenon and participants' experience. The semi-structured interview offers both structure and flexibility, allowing for follow-up questions as needed. This combination is the most popular setup in most small-scale studies. However, it may not always be the greatest option for specific needs and design constraints (Ngao, Sang & Kihwele, 2022). The interview contained twenty-two items and was conducted in English Language with the participants. The participants were literate.

Table 1: Sample Size, Data Collection Methods

Semi-structured Interview			
Head Teachers	5	In-depth Interview	Purposive Sampling
Teachers	10	In-depth Interview	Purposive Sampling
Total	**15**		

Table 2: Demographic Characteristics of Participants

Gender	**N**	**%**
Male	9	60
Female	6	40
Total	15	100
Age	**N**	**%**
28-35	4	26.67
36-43	6	40
44+	5	33.33
Total	15	100
Subject/Position	**Participants**	
Mathematics	Participant 1	
Social Studies	Participant 2	
English Language	Participant 3	
Ghanaian Language	Participant 5	
French	Participant 9	
Religious and Moral Education	Participant 10	
Career Technology	Participant 11	
Physical Education	Participant 13	
Computing	Participant 14	
Integrated Science	Participant 15	
Head Teacher	Participant 8	
Head Teacher	Participant 12	
Head Teacher	Participant 6	
Head Teacher	Participant 7	
Head Teacher	Participant 14	

Years of Experience	N	%
5 to 10 years	10	66.67
11 to 16 years	2	13.33
17+	3	20.00
Total	15	100

4.4 Data Collection and Analysis

A total of 15 respondents were sampled purposively. Interviews were held with head teachers and classroom teachers using semi-structured questions given to respondents who agreed to take part in the interview before the agreed date. Before the scheduled interview, participants were given the themes related to the interview to guide them during the interview, some of the themes include ICT tools/resources, Professional development that teachers have received on ICT, Teachers' perception of their ICT skills / how teachers evaluate their ICT skills, etc. The interview was conducted via Zoom, and different challenges were encountered during the interview including network challenge was one of them, there was frequent disruption during the interview due to network, in addition, there was a strike action during the scheduled interview, so interviews had to be rescheduled with participants due to their unavailability caused by the strike. But despite all the challenges, the interviews were eventually conducted with ease.

The data collected from the in-depth interviews were examined using thematic analysis (Braun & Clarke, 2006). The thematic analysis was chosen for this interview because it systematically organizes, analyzes, and describes the data sets. The thematic analysis of the in-depth interviews was also done to fill in the gap on the inadequate knowledge of the researcher on a certain phenomenon, like what is currently under study. Nilseng et al. (2014) proposed the application of qualitative research to investigate the unknown. The thematic analysis also allowed for analysis based on relevant and common themes from the coded data (Creswell & Creswell, 2018).

The collected data were coded and examined using manual coding. Firstly, for the thematic analysis, all the data derived from the interview were read many times to familiarize myself with the common themes. Secondly, the initial codes were generated for consideration based on the research questions. After the initial codes, certain common themes were searched in the data such as instructional technologies, electricity and internet connectivity, technical support, etc. The themes were read and re-grouped or divided. After grouping the sub-themes, these themes were distributed into major, and minor themes to produce the report (see Findings Section). For the final analysis, all 15 responses were condensed and examined for further reporting based on or under the themes of the interview questions. The thematic analysis also guided in identifying the patterns of themes in the interview data for analysis and interpretation (Creswell, 2016).

4.5 Ethical Consideration

Ethics is essential in research as it is imperative to consider the impact of the qualitative interviews on participants, the role of the researcher, and research method appropriateness (Jonsen, 1998). In this study, approval was obtained from the participating schools after which a consent form was sent to all selected participants to seek their participation. The consent form explained the purpose of the study and the risk level (see Appendix 2). Thus, participation was voluntary for all participants. Another form of scientific standards required in research that was upheld in this study was anonymity which

was crucial; participants' identities were protected through pseudonyms such as Participant 1 etc. The General Data Protection Regulation (GDPR) was followed in handling the data in a digitally secured environment to ensure confidentiality, and data was shared in a way that prevented the identification of participants. Reflexivity was also important to avoid study bias, as I considered my position as a teacher and my background as a Ghanaian, and how these might influence the research process and interpretation of data. These ethical practices were implemented to uphold the integrity and trustworthiness of the study.

Findings and Analysis

Based on the responses from this study's participants, the research questions were categorized into four considering the TAM framework: the availability of technological tools for implementing ICT as a pedagogical tool, participants' perceived level of readiness and ICT skills, the effectiveness of ICT in enhancing teaching and learning, and the challenges of implementing or integrating ICT in an SBC for teaching and learning. As proposed by Byrne (2022) and Mihas (2023), thematic analysis enables the researcher(s) to identify and understand main themes and the relationships they establish within qualitative data, without any expected outcomes. I have been informed by the theoretical framework and aimed to create interview questions that could support the knowledge interest and focus here. The common themes were sorted through the needed steps and critically summed up. Finally, the themes for reporting were sorted out according to the research questions and the theoretical framework.

RQ 1: What technological tools are available for implementing ICT as a pedagogical tool in Ghanaian JHS?

The first research question investigates participants' perceptions of the resources available for implementing ICT SBC in Ghana. Coding and analyzing participants' responses identified two main themes: instructional technologies, and electricity and internet Connectivity.

Theme 1: Instructional Technologies

From the study's findings, two-thirds of the interviewees confirmed that few technical resources were available for ICT-SBC in JHS in Ghana. Some examples mentioned by the participants include projectors, laptops, desktops, TV, radio, and smartphones. Participants also stated that even though some of these resources are available, they are either insufficient or not functional. Additionally, some of the resources available for the students were provided by private individuals or NGOs which can sometimes be ad-hoc and non-reliable because it depends on external funding. An example of this is when a participant commented that:

> *"… we have some ICT tools in the school which are sometimes useful, but they are mostly provided to the school by private individuals or NGOs, not the government. …"*
>
> **Participant 8**

Another respondent remarked that:

> *"… We have one projector for the whole school, and we also have an ICT lab which consists of about 14 computers but only 4 are functional, I think we need more ICT resources because one projector for the whole school is not enough…"*
>
> **Participant 15**

Based on these findings, there are some ICT resources for SBC, but they are sometimes not functional or not enough. The government's provision of the necessary resources is essential for the effective ICT implementation of SBC in Ghana and is urgently needed. In the 21st century where ICT is integral to the world, hence incorporating ICT-SBC in JHS in Ghana should be given the attention it deserves following the interviews.

Theme 2: Electricity and Internet Connectivity

The second theme identified from the interviews is electricity and internet connectivity. These are vital for the implementation of ICT. The interviews revealed that electricity is needed to operate most of the ICT tools they have available in the schools, similarly, internet connectivity is essential when

implementing ICT in the classroom. However, the schools often lack both, and teachers sometimes use their internet for classroom activities. One of the participants indicated:

> *"…sometimes when I want to use videos and images as a mode of instruction in the classroom, I have to use my phone and internet in the classroom for the lesson because we lack internet connectivity in the school…"*
>
> **Participant 2**

Another participant also remarked:

> *"…We don't always have electricity in the school, and when we do, we often don't find sockets available, these are things we need as an ICT resource, but we never have them in every classroom…"*
>
> **Participant 10**

It is obvious from the findings that inadequate electricity and lack of internet connection hinder the use of the few available ICT resources in the schools. Although some classrooms have few computers, some are either non-functional or difficult to use due to occasional electricity shortages.

RQ 2: How do teachers perceive their level of readiness and ICT skills concerning the implementation of the SBC?

The second research question investigates the levels of readiness and perceived ICT skills for implementing SBC by teachers within the Ghanaian JHS. The implementation and success of SBC in schools are anchored on the ability of implementers, specifically teachers to structure learning to conform with the new means of integrating technology appropriately. Three major themes identified for teachers' levels of readiness and skills are technical support, knowledge and skills, and infrastructure. One minor theme, time constraints, was identified.

Theme 1: Technical support

The coding and analysis of the responses concluded that one of the greatest issues hindering teachers' readiness, and skills is lack of technical support. Most interviewees indicated that devices such as computers, projectors, and other digital-based devices were lacking and those installed in classrooms were not working properly. One of the participants commented that:

> *"…I spent most of my class time solving technical problems, and although some classes have computers, they are poorly maintained, Before I start my lesson, I stay tense until the program on the computers starts running, I have always been discouraged by a sudden technical problem with technology equipment…."*
>
> **Participant 1**

In addition, other respondents remarked that:

> *''…Technical problems not only interrupt class but also lead to additional problems in the class. Participants said that some problems appear because of technical problems…''*
>
> **Participant 12**

> *"…While I am busy trying to solve the technical problems, students misbehave, and I lose control of the class…"*
>
> **Participant 2**

''…another teacher reported, "Because of the technical problems, I decided not to use technology at school instead I give my students homework and ask them to use their technological devices at home…"

Participant 10

From the findings, it can be deduced that teachers' experiences of technical problems in the classroom make them feel discouraged, tense, preoccupied with solving the issue, and as if they are losing control. This experience could negatively impact their perceived ease of use of ICT tools, which could eventually hinder the overall acceptance and use of technology in their teaching practices.

Theme 2: Knowledge and skills, while a considerable number of teachers interviewed acknowledged they have little knowledge and skill of ICT in the SBC, the rest indicated they have some levels of knowledge and skills in ICT integration in the SBC. Many teachers indicated (10 out of 15) that, they have never attended any training in technology integration in the curriculum.

The level of teachers' knowledge and skills in implementing SBC is vital. For teachers to acquire the needed skills for ICT integration into the curriculum, knowledge, and skills such as basic PowerPoint, Excel, and Word processing packages are recommended. From the findings, Teachers who attended training sessions (5 teachers) indicated that the training sessions focused on basic computer skills related to Word processing, PowerPoint, Excel, and other applications.

One of the respondent remarks:

"…I have technical skills in using technology for my personal use, but I feel like I do not have the knowledge and skills to integrate technology into the curriculum. What we as teachers need right now is appropriate training in the use of technology for education purposes. Teachers need to have training to be able to implement digital curriculum…"

Participant 14

It is evident from the teachers' responses that educational authorities in Ghana have not prioritized formal or informal training to allow teachers to acquire some skills in technology.

Theme 3: Infrastructure

The lack of infrastructure for implementing the SBC was the third major theme of the interview. Respondents acknowledged that even though many schools have access to technology, most teachers reported that they are insufficient. Two-thirds of interviewees addressed the lack of technology devices in most schools as a major factor that hinders their use of ICT for instruction. Some responses are shown below.

"…I have to bring my computer or data show sometimes…''

Participant 1

"… we cannot use any kind of technology in the classroom, there are no electrical outlets in the classrooms…''

Participant 6

"…since there is no electricity connection in the classroom, I have never used technology in my teaching …''

Participant 15

Not having the internet in the classrooms is another challenge for teachers. More than 5 respondents complained of poor internet connection, and 10 out of 15 said they connect their smartphones with their data to show internet materials. According to the curriculum, ICT tools and resources are required for teachers to engage in the teaching and learning process. However, due to the challenges mentioned, teachers are often forced to teach without these tools or make do with their resources.

RQ3: Are teachers perceiving ICT for SBC as effective for enhancing teaching and learning experiences?

The third research question of this study sought to gather and solicit the opinions of interviewees on the effectiveness of ICT in standard-based curricula and its utilization in enhancing teaching and learning experiences. The coding of the data collected from the interviews generated the following opinions. The following three themes were identified (collaboration and productivity, concentration and comprehension, engagement, and knowledge retention). When asked about the effectiveness of ICT-SBC in teaching and learning, most of the respondents 7 out of 15 reported that ICT-SBC is effective and necessary for promoting the teaching and learning experiences of both teachers and students.

Theme 1: Collaboration and Productivity

One of the respondents mentioned that:

> *"…In my opinion, ICT for teaching increases collaboration and productivity. ICT implementation in classrooms and access to online content help to optimize instructional time by eliminating too much writing on the whiteboard and increasing learning outcomes. The collaborative component ensures connectivity between teachers and students..."*
>
> **Participant 4**

Another respondent remarked that:

> *''…In my view, ICT as a tool promotes communication between teachers and students…. the quick access to educational resources stimulates motivation…''*
>
> **Participant 12**

Theme 2: Concentration and comprehension

The second theme is the effectiveness of ICT in standard-based curricula and its utilization in enhancing teaching and learning experiences.

Respondents mentioned that:

> *"…The activities carried out through ICT and interactive tools increase student concentration and, therefore, help students to understand concepts more quickly, enhancing learning…"*
>
> **Participant 8**
>
> *''... ICT tools involve students in more practical learning, to reinforce what they have learned …"*
>
> **Participant 5**

Theme 3: Engagement and Knowledge Retention

Responses from interviewees showed that ICT helps students regain knowledge and makes learning interesting for learners hence improving the interaction between teachers and learning and making learners more involved in the learning process. One of the participants mentioned that.

> *"…When ICT is integrated into lessons, students become more engaged in their work. This is because technology provides different opportunities to make it more enjoyable in terms of teaching the same things in different ways…"*
>
> **Participant 2**

RQ4: What are the challenges of implementing/integrating ICT in an SBC for teaching and learning in Ghanaian JHS?

Even though the implementation of ICT in SBC is regarded as a traction for accelerated development of the Ghanaian educational system, some challenges still need to be addressed. Three themes were identified from responses from interviewees regarding the challenges they face as teachers when implementing ICT in SBC, which needs urgent attention to improve the standard of the teaching and learning process. The themes include teachers' professional development; limited budgetary allocation for implementing ICT-SBC; inclusive considerations, and the digital divide.

Theme 1: Teacher's Professional Development

Out of the 15 participants, 8 mentioned that they lack professional development, and personal effort to improve their implementation of ICT. Moreover, the lack of structured professional development makes it a challenge to implement ICT in the SBC. They also highlighted the importance of professional development which would help improve teachers' attitudes toward ICT use in the classroom. One participant shared their perspective, stating:

> *"…The general lack of professional development is a key challenge to the implementation of the ICT-SBC. Teachers need specific professional development training to enhance their skills in the use of ICT for teaching and learning, assessments, individualized instruction, accessing online resources, and for fostering student interaction and collaboration…"*
>
> **Participant 7**

Similarly, another respondent mentioned that:

> *"...I believe professional development training in ICT skills could positively impact teachers' general attitudes towards ICT use in the classroom, but it should also provide specific guidance on ICT use in teaching and learning within each discipline. Without this support, teachers tend to use ICT for skill-based applications, limiting student academic thinking. To support teachers as they change their teaching, it is also essential for education managers, supervisors, teacher educators, and decision-makers to be trained in ICT use…"*
>
> **Participant 4**

Theme 2: Limited budgetary allocation

On the challenge of limited budgetary allocation, more than half of the participants indicated that budget allocation for ICT should be increased, citing it as one of the biggest challenges they face. They stated that decision-makers pay little or no attention to the need to increase the budget of ICT SBC. One of the respondents said that.

> *"…The government should strengthen its policies to provide schools with the minimum acceptable infrastructure for ICT-SBC, including stable and affordable internet connectivity and security measures such as filters and site blockers. Policies and guidelines for teachers as key implementers need to target basic ICT literacy skills, ICT use in pedagogical settings, and discipline-specific uses, this is a necessary investment in learners' future because they are the builders of nations…"*
>
> **Participant 2**

A similar response was given by participant 6

> *"… Successful implementation of the SBC requires integration of ICT, Government or people responsible for the educational sector should increase the budget for ICT, increase teachers' salaries also, there is for the benefit of both teachers and learners…"*

However, 2 out of the 15 participants emphasized that the government needs to make a conscious effort to improve the culture by providing digital content in local languages. They cited reasons for improving Ghana's culture and heritage while implementing ICT. For instance, one participant stated that:

> *"…The government should try to develop digital content needs in local languages and reflect local culture. This could also expose our cultures and traditions to other countries…"*
>
> **Participant 8**

It is evident from the findings that teachers believe that policymakers or the government should strengthen their educational policies and increase the budget allocated to the education sector. Furthermore, the necessary bodies should ensure the effective implementation of these policies and provide the required training, tools, and resources for ICT implementation in the educational system.

Theme 3: Inclusive considerations (Digital divide)

On the lack of inclusiveness, 10 out of 15 participants indicated that the digital disparities of digital media and internet access within Ghana, the gaps between urban and rural areas, and digital literacy and skills to utilize the internet were key setbacks. The digital divide both creates and reinforces the socio-economic inequalities of the people. One of the respondents believed that.

> *''…Policies need to be made to bridge the divide between the urban and rural communities, policies need to be implemented to bring media, internet, and digital literacy to all students, not just those who are easiest to reach…"*
>
> **Participant 14**

Similarly, Participant 11 mentioned that:

> *"…Students whose mother tongue is different from the official language of instruction [English Language] are less likely to have computers and internet connections at home than students from the underprivileged. There is also less material available to them online in their language, putting them at a disadvantage to their majority peers who gather information, prepare talks and papers, and communicate more using ICT…"*

Participants mentioned the digital divide between urban and rural communities in Ghana. Students from privileged backgrounds have access to more ICT tools and resources, either provided by their parents or through private institutions that their parents can afford. In contrast, students from lower economic brackets find it difficult to access these tools at school or home due to their unavailability.

Implementing ICT-SBC is described by many scholars as the ultimate means of promoting accelerated productivity in education. It is however unfortunate to note that in a developing country like Ghana, this initiative is hindered by many challenges. It could be deduced from interviewees' responses that teachers' professional development; limited budgetary allocation and inclusive considerations (digital divide) are the leading challenges for implementing ICT-SBC.

Discussion

This study investigated the implementation of ICT as a pedagogical tool in the SBC in the Ghanaian JHS. The interviews explored the availability of technological tools for implementing ICT as a pedagogical tool, participants' perceived level of readiness and ICT skills, the effectiveness of ICT in enhancing teaching and learning, and the challenges of implementing or integrating ICT in an SBC for teaching and learning.

This section examines the study's findings with the literature review and the research questions considering the application and relevance of TAM to these findings. The study reveals that perceived usefulness and ease of use in the SBC for teaching and learning in Ghanaian JHS, and the structural barriers related to resources and infrastructure affect its implementation. This study adds to the understanding of TAM by highlighting the challenges faced in resource-scarce environments, where acceptance is influenced by not only teachers' readiness but also the availability of resources.

To begin with, teachers' level of readiness and ICT skills for SBC was investigated. The TAM framework helps understand teachers' acceptance of ICT in this study. According to TAM, perceived ease of use is one of the key factors determining technology acceptance. The study's findings suggest that teachers' readiness and ICT skills impact their willingness to integrate technology into their teaching. The implementation and success of ICT-SBC in teaching and learning in Ghanaian JHS hinges on the ability of teachers to restructure learning to conform with the new technology integration approaches. Teachers' skills in coming out with socially active classrooms, group work, appropriate pedagogy, encouraging collaborative learning, and encouraging cooperative interaction among students are pivotal in an ICT-SBC as suggested by Ampofo et al. (2020).

The study found that lack of resources and technical support greatly impacted teachers' perceived ease of use of ICT. While teachers are ready to integrate ICT, barriers such as malfunctioning devices, insufficient infrastructure, and lack of training reduce the ease with which technology can be adopted. Not only did the technological issues cause disruptions in the classroom, but they also made teachers discourage technology use. This finding is consistent with studies by Waiganjo (2021) who reported that insufficient technical support contributes to discouraging ICT integration in class. These barriers make things even harder, particularly in underfunded schools where structural issues override personal readiness to use ICT. Furthermore, many teachers mentioned that they never received training in technology integration in their classrooms. This is a serious problem in Ghana since effective integration of ICT into the curriculum requires teachers to acquire specific skills. Bhandari (2020) argues that due to a lack of training in using ICT, teachers couldn't use ICT in their teaching to address the students' interests independently.

Additionally, most teachers acknowledged the lack of infrastructure was one of the biggest obstacles to SBC implementation. This is in line with studies by Hennessy et al. (2022), Kozma & Isaacs (2011), and Kumar (2023), who emphasized that access to ICT infrastructure and resources is critical for integrating technology into education.

The findings suggest that lack of technical support, insufficient training in technology integration, and inadequate infrastructure affected teachers' readiness to embrace and use technology in the classroom. This is in line with TAM, perceived ease of use is influenced by these variables. TAM helps to illustrate that perceived ease of use is shaped by technical support, training in technology integration, and the provision of infrastructure, all of which play a key role in teachers' acceptance and use of technology in schools.

Regarding the effectiveness of ICT for SBC, the participants generally viewed ICT as useful for enhancing teaching and learning. They felt more positive about integrating ICT into their teaching and its potential for promulgating student engagement, knowledge retention, and improving lesson

delivery, especially in classrooms where collaborative learning and interactive learning are encouraged. This finding aligns with Vargas-Montoya et al. (2023) who argued that ICT encourages students to be more active and participate in the lesson making them more proactive and take on more responsibilities for a better learning experience. The study supports the findings of Sentence & Csizmadia (2017) and Yidana & Aboagye (2018), who highlighted the role of ICT in making complex subjects more accessible and engaging. Using the TAM framework, the study demonstrates that perceived usefulness strongly influences teachers' acceptance and use of ICT. However, challenges such as lack of infrastructure and training hinder ICT adoption. These issues must be resolved to enhance teaching and learning and promote wider acceptance of technology in education.

The study also examined the availability of technological tools for implementing ICT in Ghanaian junior high schools (JHS) and how it impacts teachers' perceived ease of use, using the lens of the TAM framework. The findings indicate that some ICT resources are available, however, the participants mentioned that they are inadequate often malfunctional, and largely dependent on unreliable external funding from NGOs or private donors. Additionally, lack of electricity and internet connectivity hinder the use of these resources, affecting teachers' and students' adoption of ICT. This is consistent with the findings of Mwapwele et al. (2019) and Nkengbeza et al. (2022), who noted that the problem of accessibility to existing hardware hinders the effectiveness of ICT utilization in teaching and learning. In all, the availability of resources plays a key role in shaping the perceived ease of use of technology in the classroom.

Finally, several challenges were identified in implementing ICT in the SBC in Ghanaian JHS such as limited access to essential resources, internet connectivity, and a digital divide between urban and rural areas. Inadequate funding further hinders equitable access to technology and lack of professional development opportunities limiting participants' skills and knowledge of ICT. These challenges align with TAM, as perceived ease of use is closely tied to the limited resources where teachers find it challenging to use the technology with the number of students in the class. The ratio of students to resources makes ICT utilization difficult in the classroom. Without proper funding ICT integration in education remains a challenge.

Although ICT adoption is vital for education, especially in settings like underfunded Ghanaian JHS, the scarcity of resources exacerbates it. Despite the significance of TAM, which demonstrates that teacher acceptance is key, it is obvious from the findings that the lack of basic infrastructure creates a challenge. It is evident from the responses gathered that perceived ease of use was constrained by structural challenges rather than teacher resistance. While teachers may be eager and ready to use ICT in their classrooms, external factors significantly impede their capacity to do so effectively. Addressing these structural challenges is essential to improving ease of use and promoting successful technology integration in education.

This study contributes to the literature on ICT integration in education and TAM by demonstrating that while TAM's perceived usefulness and ease of use are important, they are insufficient to explain ICT adoption in underfunded contexts. The findings highlight that limited acceptability will persist if infrastructure and resource-related issues are not addressed. This is especially important in developing countries like Ghana, where the digital gap in education is made worse by underfunding and unequal resource distribution.

Limitations of this Study

This study investigated the implementation of ICT in the SBC in Ghanaian JHS, providing valuable knowledge about ICT–SBC implementation in Ghana. However, it is important to note that certain limitations are fundamental in this study.

The first limitation of the study is the lack of observational data as a data collection method. Due to the physical distance between the researcher and the research site, it was not feasible to conduct on-site observations. As a result, interviews were used as the primary data collection method. Although the interviews yielded valuable insights, the absence of direct observations may have limited the context of the findings. Incorporating observational data into future research will produce a deeper understanding of integrating ICT in schools.

Again, the participants' reluctance to engage in interviews because of an ongoing industrial action presented another limitation. The strike led to participants being aggrieved and vacating their classrooms, which could have influenced their responses and introduced bias into the findings. The unpredictability and dissatisfaction caused by the industrial action may have compromised the accuracy of the data gathered. Future research should consider conducting studies during more stable periods to guarantee participant willingness and data reliability.

Moreover, the study’s findings may not be generalizable beyond the specific context of the schools and participants involved. The study was conducted in an urban city and a particular region, focusing on public school teachers. This may limit the generalizability of the results to other regions or educational systems with different characteristics. Expanding the research to encompass a wider range of schools and diverse educational settings in Ghana could help establish the generalizability of the findings.

In conclusion, the limitations highlighted point to the areas that need more exploration, to understand ICT-SBC implementation and its effects on education, and future research should examine these constraints to provide more insight into this area of study.

Conclusion

This study investigates the implementation of ICT as a pedagogical tool in the SBC in the Ghanaian JHS. A qualitative case study approach was employed, sampling 15 participants from six JHS in the Kumasi Metropolis, Ghana. The Technology Acceptance Model (TAM) provided a framework for understanding ICT adoption in Ghanaian JHS.

The effectiveness of ICT utilization in enhancing teaching and learning experiences within JHS revealed multifaceted opportunities. The study showed that ICT is effective and necessary for promoting teachers' teaching and learning experiences and enhances students' concentration and comprehension, engagement and retention, collaboration, and productivity. Respondents acknowledged ICT as a powerful tool for improving educational outcomes at the basic education level in Ghana. However, prioritizing resource availability, readiness and ICT skills of teachers, human capital development, collaboration and knowledge exchange, and research and development are crucial before and during ICT implementation of educational policies such as the ICT-SBC in Ghana.

Some tools were identified as major tools or resources used in the classroom such as projectors, laptops, desktops, TV, radio, and smartphones. However, these tools were noted to be scarcely supplied by respondents.

Teachers' readiness and perceived ICT skills are pivotal for implementing the ICT-SBC. The ability of teachers to structure learning effectively, foster collaborative learning, and create interactive classrooms is crucial. This study highlights the importance of regular training for teachers to acquire necessary technological skills.

Despite the potential of ICT to promote productivity in education, the findings in this study identified significant challenges. These include unreliable electricity, inadequate professional development, limited budgetary allocation, insufficient technological and instructional resources, and poor internet connectivity. These challenges underscore the importance of implementing infrastructure to support ICT use in SBC.

In summary, while ICT has the potential to enhance educational outcomes, addressing the challenges of inadequate technological resources, lack of training, budgetary constraints, and infrastructure is essential for its successful implementation in Ghana's basic education system. Policymakers must prioritize resource allocation and professional development to ensure the effectiveness of the ICT-SBC, ultimately enhancing the educational experiences and outcomes for students in Ghana. The study’s findings show that ICT is effective despite various challenges; addressing these challenges could ensure the successful implementation of SBC in Ghanaian JHS.

Recommendations

Based on the study’s findings, the following recommendations are made to policymakers before introducing educational initiatives such as the implementation of ICT-SBC:

1. **Targeted or in-service Training Programs:** The Ministry of Education should implement targeted training programs to build the needed skills of implementors, particularly focusing on head teachers and classroom teachers.

2. **Investment in ICT infrastructure:** The government through the Ministry of Education and other stakeholders of education should prioritize essential ICT infrastructure, including reliable electricity, internet connectivity, and access to functioning ICT tools.

3. **Seek partnerships for sustainable funding:** The government should seek sustainable funding through collaborations with NGOs, private sector organizations, and international donors focusing on securing long-term funding to support ICT in education.

4. **Provide on-site technical support:** Technical support personnel should be available in the district to support teachers and maintain and troubleshoot malfunctioning equipment to encourage teachers' adoption of technology.

5. **Research and Development:** Educators should conduct further research on this study to deepen the understanding of the dynamics between teachers' attitudes toward ICT adoption and address the concerns and reservations associated with ICT integration in SBC implementation.

These policy implications and recommendations are to facilitate the successful integration of ICT into the SBC in Ghana's education. The Ministry of Education may leverage the benefits of ICT while limiting possible obstacles by addressing the digital skills gap, and resource deficit, and continuously conducting research around this study.

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Appendix 1: Interview guide

1. What's your gender?
2. How old are you?
3. How long have you been a head/teacher?
4. What subject do you teach?
5. What do ICT tools and resources mean to you?
6. If they have a reply for Question 1, What ICT tools/ resources have you used?
7. What ICT resources do your school have?
8. Who are the bodies in charge of providing these resources?
9. From your perspective, are these tools and resources enough?
10. What's your perception regarding using these tools and resources?
11. How often do you use these tools?
12. What strategies do you employ to incorporate ICT into your lesson plans and teaching methods?
13. Were you provided training or professional development regarding the use of these tools and resources?
14. If yes, what kind of training or professional development?
15. What support do you think the government can provide to help teachers receive the necessary skills to aid their ICT implementation in the classroom?
16. How do you perceive or evaluate your ICT skills?
17. How would you rate your level of confidence in utilizing ICT as a pedagogical tool in your teaching practices?
18. What specific ICT skills do you feel proficient in, and which areas do you think you need further development?
19. What are the benefits of using these tools?
20. How do you perceive the overall implementation of ICT into the standard-based curriculum in Ghanaian basic schools?
21. How do you evaluate ICT as a pedagogical tool for the standard-based curriculum?
22. When using these tools, what are the challenges/barriers you face? Can you share any challenges or limitations you have encountered in accessing ICT resources for teaching purposes?

Appendix 2: Consent form

Participant Information & Informed Consent Form

Assessing the implementation of ICT as a pedagogical in the Standard-Based curriculum in Ghanaian basic schools

Thank you in advance for considering participation in this study!

Information about Organizing Researchers

Annika Bergviken Rensfeldt (Professor) Senior Lecturer, University of Gothenburg, Sweden.

Reginald Oppong, M.Sc. student, Gothenburg University, Sweden.

Questions and answers regarding the study

Below, you will find a number of questions and answers that are required for informed consent. When you have familiarized yourself with the study enough to decide on participation, please proceed to the Informed Consent Form.

What is the purpose of this study?

The purpose of this research is to increase knowledge by conducting a comprehensive assessment of the availability of resources for ICT implementation as a pedagogical tool, as well as assessing the development and skills of teachers required for the effective utilization of ICT in teaching and learning practices within Ghanaian junior high schools (JHS).

What data will be collected during the study?

During the Interview, we will collect the following data: audio and video recordings.

How will my data be used?

Your data will be used to produce scientific knowledge on how to implement ICT resources as a pedagogical tool and professional development strategies for teachers to enhance and motivate their ICT utilization in the classroom.

How will my confidentiality be managed?

All data is collected and stored in a digital or physical environment to ensure a level of anonymity that will not expose any personally identifiable information. The data will be handled according to the General Data Protection Regulation (GDPR).

Are there any benefits from my participation?

We hope that you will learn more about ICT resources for instruction, teachers' perceptions as well as motivation for using ICT for teaching and learning.

Are there any risks involved in participating?

There are no risks involved in participating in this study.

What will happen if I don't want to proceed with the study?

You are free to withdraw from the study at any time, no questions asked, and without waiving legal rights. If you decide to leave the study, you should inform the principal researcher. All data up until

the date of your withdrawal may be used. You retain the right to decide whether data from any post-withdrawal assessments can be used.

Will I be paid for taking part in this study?

We are not able to compensate you for your participation in this project.

Contact Details

Researcher:

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☎: +46762591436

✉: reginaldoppong13@gmail.com

Informed Consent Form

Assessing the implementation of ICT in the Standard-Based curriculum in the Ghanaian basic schools

By signing this form, you confirm that the following conditions have been met:

I have read and understood the provided information

I have had the opportunity to ask questions about the study

I have received satisfactory answers to all my questions

I understand that a copy of my data will be stored digitally and archived at the end of the study

I understand that I am free to withdraw from the study at any time without giving a reason

I understand that if I withdraw from the study, any data generated up until the withdrawal may be used

Furthermore, you consent to the following procedures:

I consent to the use of my data in the current study

I consent to be audio and video recorded during workshops and interviews

I agree to participate in the study