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Exploring ICT Knowledge Sources And Usage Among Upper Primary Teachers In Implementing Standard-Based Curriculum

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Abstract
This study examined the sources of ICT knowledge among upper primary teachers and their utilization of ICT tools in the implementation of the standards-based curriculum in selected primary schools within the Ketu South Municipality of Ghana. The study utilized an interpretivist paradigm and a qualitative approach, employing a descriptive case study design. Twenty participants, comprising fifteen upper primary teachers and five headteachers, were purposively sampled from eight selected public basic schools in the Ketu South Municipality to gather pertinent data through face-to-face interviews. The analysis of the data employed themes. Key findings were that upper primary teachers in the selected schools rely on various sources to obtain knowledge regarding ICT tools. Among the various sources identified by the teachers, collaboration with fellow educators or ICT specialists, as well as engagement with IT professionals, emerged as the primary source. Additionally, the teachers utilized ICT tools for instructional support, information retrieval, and concept demonstration. Hence, educational authorities in the Ketu South Municipality should improve teachers' integration of ICT in the implementation of the standard-based curriculum through organizing regular, hands-on professional development programs, fostering collaborative learning communities, providing ongoing support and infrastructure, and utilizing feedback, recognition, and mentorship to ensure sustained and effective ICT use in classrooms.

Keywords: *standards-based curriculum, ICT tools, collaboration, teaching aids, demonstrating concepts*

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I. Introduction

The rapid advancement of ICT has transformed the modern world, influenced 21st-century societal demands and driven globalization and economic growth through enhanced transnational communication and commerce (Maneejuk & Yamaka, 2020). Consequently, many nations and institutions, including those in education, have integrated ICT into daily operations. In education, Danso and Kesseh (2016) observed that the adoption of computer technologies has improved ICT knowledge and skills among teachers and learners, enhanced knowledge sharing, and supported effective teaching. Similarly, Claro et al. (2018) highlighted that ICT use fosters students' higher-order thinking, creativity, and adaptability to technological shifts in society and work.

The global benefits of integrating ICT tools into education have driven curriculum reforms that promote its use in teaching. Ghana's Standard-Based Curriculum (SBC), introduced in 2019, reflects this by encouraging ICT as a pedagogical tool to develop 21st-century skills such as digital literacy (NaCCA, 2019a, 2019b; Ministry of Education, 2019). The curriculum also emphasizes learner-centred, ICT-supported approaches. The European Commission (2013) noted that ICT effectiveness depends on teachers' sources of ICT knowledge and classroom use. Although nationwide workshops introduced teachers to the SBC before the 2019/2020 academic year (Daily Graphic Online, 2019), studies show many lacked the ICT skills needed for implementation (Abdulai et al., 2019; Donkor, Ghanney & Dwamena, 2024). This study, therefore. explored upper primary teachers' ICT knowledge sources and usage in implementing the SBC in Ketu South Municipality, Ghana.

Globally, Information Communication and Technology (ICT) tools have become vital across all sectors of life and are deemed essential in every field. Razak et al. (2018) found that ICTs significantly enhance teaching and learning when effectively integrated into the curriculum. In recognition of the widespread impact of ICTs, Ghana's Standard-Based Curriculum (SBC) promotes the use of ICT tools as a pedagogical approach at the primary education level (Ministry of Education, 2019). This implies that all teachers, regardless of their ICT skill level, are expected to integrate ICT into their teaching. Beyond subject knowledge, teachers also need strong pedagogical knowledge of ICT applications, as they are the primary implementers of the curriculum and require the necessary skills to use ICT tools effectively in instructional activities.

However, before the implementation of the SBC, both local and international studies revealed that many teachers lacked the knowledge required to use ICT tools in curriculum delivery. Natia and Al-hassan (2015) found that although many teachers had access to ICT tools like computers, they lacked the technical skills to use them effectively in lessons. Similarly, Amenyedzi et al. (2011), as cited in Soma et al. (2021), reported that while educational institutions possessed ICT tools such as computers and projectors, most teachers did not use them due to insufficient ICT knowledge and skills. Supporting this on a global scale, some studies revealed that teachers lacked the necessary competencies for integrating ICT tools in teaching and learning (Atashak & Mahzadeh, 2011; Mirzajani & Mahmud, 2016).

Drawing from these earlier findings, this study aimed to examine the sources of upper primary teachers' knowledge on ICT tools and how they apply these tools in implementing the SBC in selected public basic schools in the Ketu South Municipality of Ghana. Given the limited empirical research on this topic since the introduction of the SBC, the study sought to fill this gap and contribute to the understanding of how upper primary teachers acquire and utilize ICT skills in curriculum implementation in the municipality.

The study's findings will inform pre-service and in-service teacher training by identifying effective ICT knowledge sources and usage patterns, helping schools align resources and strategies for practical ICT integration. It will also support the design of relevant professional development programmes and assist the Ghana Education Service (GES) in aligning ICT policies with classroom realities, improving SBC implementation. Additionally, the study will highlight gaps in ICT infrastructure and support systems, guiding equitable resource distribution and supporting national strategies to enhance teacher ICT competence, especially in under-resourced areas, thereby promoting digital education equity. In view of these significances, the following research questions were formulated to guide the study:

1. How do upper primary teachers in the selected primary schools in the Keta South Municipality acquire knowledge about the use of ICT tools in the implementation of the SBC?
2. How do upper primary teachers in the selected basic schools use ICT tools in implementing the SBC in selected primary schools in the Ketu South Municipality?

II. Literature Review

The study is grounded in Rogers' Theory of Diffusion of Innovation, which describes how new ideas or technologies spread within a social system (Medlin, 2001; Sarfo et al., 2016). Diffusion occurs through communication over time, involving different channels and individuals (Gyamfi & Gyaase, 2017). Here, the school acts as the communication channel, and the innovation is ICT use in implementing the Standards-Based Curriculum. The theory includes four dimensions: time, innovation, communication channels, and social system (Dintoe, 2018). Innovation means new ideas (Rogers, 2003); adoption speed is time; communication spreads innovation, and the social system pursues shared goals (Mwila, 2018). Teachers' ICT knowledge affects ICT policy adoption, guiding this study's focus on how upper primary teachers in Ketu South Municipality acquire ICT knowledge.

The theory also includes a five-stage decision process: knowledge, persuasion (Hajara & Bukari, 2017), decision (Rogers, 2003), implementation, and confirmation (Sherry, 2011). Teachers need ICT knowledge and training to integrate it into teaching (Wetzel, 1993, as cited in Akuffu, 2020). However, attitudes also influence adoption, highlighting the need for support and motivation. The implementation stage involves applying innovation with support to reduce uncertainty, while the confirmation stage focuses on evaluating continued use (Sherry, 2011) since successful adoption of ICT tools depends on users' readiness. Teachers need ICT knowledge and skills, supported by regular training, as tools alone are insufficient without proper understanding (Wetzel, 1993, as cited in Akuffu, 2020). Since attitudes also influence adoption, teachers must be motivated and educated on ICT benefits.

Sustainable Development Goal 4 calls on all countries to ensure quality education for all by 2030 (UNESCO, 2021), requiring the adoption of innovative pedagogies (Yekple et al., 2022). Modern classrooms must support diverse learners through engaging practices that enhance learning outcomes, leading many teachers to integrate ICT tools for effective teaching. In Ghana's 21st-century education system, ICT is vital to implementing the Standard-Based Curriculum (SBC). Research both locally and globally highlights ICT's importance in teaching, with computers aiding lesson planning, student performance analysis, and communication. Buabeng-Andoh and Yidana (2015) found ICT used for lesson preparation, while Abedi (2023) noted its use in lesson delivery, research, group instruction, and assessment. These applications reflect teachers' preference for ICT as a productivity tool that supports teaching methods, techniques, strategies, and improves student learning outcomes.

A study by Enu et al. (2018) found that teachers primarily use ICT for communication with family and friends, and most lacked training in ICT literacy or its application in teaching, leading to infrequent integration of ICT in lessons. Similarly, Khokhar and Javaid (2016) reported that teachers have access to ICT tools like desktop PCs, laptops, tablets, and smartphones, which they use for communication, information search, and lesson

preparation. Swandewi (2018) noted that teachers use ICT tools based on the type of tool and topic, such as Quipper School for student searches or videos and PowerPoint for lessons (Earle, 2002 cited in Jatileni & Jatileni, 2018).

The pedagogic use of ICT tools by teachers can be grouped into three types (Kennah, 2016). Kennah (2016) explained that some teachers actively used ICT during lessons, such as using phones and iPads to show real-life images or laptops and projectors to display videos with explanations. Others integrated ICT through personal effort, while passive users employed ICT mainly for lesson planning or guiding student research. Mutude (2017) also found limited ICT use for teaching, with only 7.0% using it for lesson delivery and 68.0% for record-keeping. Similarly, Oni & Uko (2016) reported low teaching use despite availability of ICT tools and resources.

Means of acquiring ICT skills include professional development programmes, peer collaboration, self-directed learning, and formal education, which enhance teachers' ICT competencies and pedagogy. These strategies are delivered through formats like online courses, webinars, videos, face-to-face sessions, mentoring, and on-the-job training (Echols et al., 2018). Beebe (2004), Safahieh and Asemi (2008), and Kumar and Kaur (2006), as cited in Oyedokun et al. (2018), identified formal education, self-study, and colleague support as key methods. Similarly, Udo-Anyanwu and Emmanuel (2019) cited conferences, workshops, on- the-job training and collaboration. Babu (2007), cited in Judah et al. (2022), and Omotunde (2017) noted self-learning and peer support as vital for ICT integration.

A study by Bassey and Ofre (2013) found that academic staff at the University of Calabar primarily acquired ICT skills through self-directed learning, peer collaboration, workshops, private training centres, and university sponsorship, with most relying on personal efforts rather than formal training. Likewise, Shiekuma et al. (2020) revealed that academic staff in Benue State, Nigeria, gained ICT competencies mainly through self-education, private training, and peer collaboration, workshops, seminars, among others emphasizing that teachers often develop ICT skills through workplace interactions, self-education, and individual initiatives.

III. Methodology

The study employed a descriptive case study design with a qualitative approach, grounded in the interpretivist paradigm, to explore the sources of ICT knowledge among upper primary teachers in selected public basic schools in the Ketu South Municipality and how they use ICT tools in implementing the SBC, aiming to understand participants' experiences in depth within their real-life contexts (Tetnowski, 2015; Addai-Mununkum & Setordzi, 2023; Cresswell & Poth, 2018). The study was conducted in the context of public basic schools in Ghana's Ketu South Municipality, targeting 15 purposively selected upper primary teachers and 5 headteachers trained in ICT use prior to the SBC implementation, with participants required to be full-time staff with at least two years of experience; the sample size was suitable for a qualitative descriptive case study aimed at gaining in-depth, contextual insights (Creswell & Poth, 2018; Yin, 2018; Fraenkel et al., 2018).

Data, gathered through face-to-face interviews using a semi-structured interview guide, enabled a planned yet flexible approach with probing and follow-up questions for clarity, which facilitated in-depth discussions and clear explanations of the phenomenon. Ethical considerations such as informed consent, confidentiality, anonymity, and data encryption were observed throughout the process. The study's trustworthiness was ensured through confirmability, credibility, dependability, and transferability (Polit & Beck, 2018; Stahl & King, 2020), achieved by building participant trust over 30 days, conducting member checks, documenting research procedures, providing detailed contextual descriptions, and obtaining expert feedback to validate findings.

Data Analysis

This qualitative study explored the sources of ICT knowledge among upper primary teachers and how they use ICT tools in implementing the standard-based curriculum in selected primary schools in the Ketu South Municipality of Ghana. The data obtained through semi-structured interviews were analyzed using themes. Pseudonyms were also used for the participants to ensure anonymity.

IV. Results And Discussion

The results and discussion are presented based on the research questions and the themes generated.

Sources of ICT Knowledge Among Upper Primary School Teachers

The responses from the participants suggest that their source of knowledge on how to utilize ICT tools in the implementation of the SBC included attending workshops or seminars, collaboration, self-directed learning, and formal education and training.

Collaboration

In general, the upper primary teachers in the selected Basic Schools in the Ketu South Municipality mentioned that they collaborate to gain in-depth knowledge on how to integrate and utilize ICT tools in the teaching and learning process. The participants explained that they either collaborate with colleague teachers or ICT teachers during or after PLC meetings and collaborate with professionals or IT experts.

One of the teacher participants said that:

Sometimes when it happens that I do not have any knowledge on how to use a particular ICT tool to implement the curriculum content, but it is significant to utilize it, I fall on a friend or a colleague teacher who knows much about it to help me use the tool to deliver to my best **(T7, Field interview, 2023).**

Another stated that:

With the collaboration with my colleagues, we have a programme called PLC that we normally do in school, so we gather and share our various ideas. For example, the topic that we discussed was on how to use diagrams in teaching mathematics. We learnt about how to draw and demonstrate pie charts or graphs using the laptop. A colleague teacher who is knowledgeable in using the laptop for the drawing of the diagrams helped us to understand how to use the laptop to draw the diagrams **(T 6, Field interview, 2023).**

A teacher participant mentioned that:

Sometimes I even rely on an IT expert who already has the idea of how to use a particular ICT tool. For example, I remember I once went to an IT expert as we were doing software in ICT and I asked him about to how to do certain things and he guides me **(T10, Field interview, 2023).**

Another participant added that:

Except that some of us, for example, my brother, is an IT expert so he has a shop where I normally go to help him type, print and do other things. When I get difficulties or come across something as a challenge in using ICT tools, I do call him to direct me about how to go about it. So, for me I can say that I gain my knowledge from him on how to use the ICT tools for teaching **(T1, Field interview, 2023).**

One headteacher stated that:

With the introduction of PLC in schools, I have seen teachers on several occasions collaborating with one another, and they shared ideas on how to teach a particular topic. Notwithstanding, they also collaborate and share ideas with another on how to use a particular ICT tool in teaching and learning **(H5, Field interview, 2023).**

The statements suggest that while upper primary teachers in the selected public basic schools collaborate with colleagues or ICT teachers to gain knowledge on using ICT tools, this support typically occurs outside of PLC meetings, aligning with Udo-Anyaanwu and Emmanuel (2020) and Omotunde (2017), who found that educators acquire ICT skills through workplace collaboration. In contrast to earlier studies by Udo-Anyaanwu and Emmanuel (2020), Omotunde (2017), Manzo (2020), Bassey and Ofre (2013), and Judah et al. (2022), the study found that upper primary teachers in the selected public basic schools in the Ketu South Municipality often seek support from IT personnel or experts rather than colleagues to understand and apply ICT tools, believing these professionals are more knowledgeable in the field.

Attending Workshops or Seminars

The upper primary teachers in the selected basic schools in the Ketu South Municipality explained that aside collaborating with their colleague teachers or ICT teachers and IT personnel, they also attend workshops or seminars to be knowledgeable on how to use the ICT tools in the implementation of the SBC.

A teacher participant expressed:

I gained the knowledge of using ICT tools in teaching when we went for workshop organized by USAID, and they taught us how to use these tools. We were taught many ways to use the ICT tools and from there, I developed interest in using the ICT tools. Also, an ICT class was organized in one of the senior high schools and some of the teachers were selected and I was one of them. We went there to learn about the ICT tools, and it was my first time that I have learnt about the usage of laptop in teaching. Based on the knowledge gained, after the workshop, I bought a Bluetooth speaker and I started using it in class to teach **(T 3, Field interview, 2023).**

In addition, one of the teacher participants revealed:

We attended a workshop where they explained to us about ICT tools and how to use them. Some of the workshops were organized before the implementation of the new curriculum [SBC] and others after the

implementation of the new curriculum [SBC]. The focus was on how to use ICT tools in teaching and learning. We were taken through the tools that we must use one after the other and how to use them to teach the pupils so that they can get an understanding of the concepts. My knowledge about the use of ICT tools in teaching was gained through the workshops that I have attended **(T 5, Field interview, 2023).**

Another teacher participant stated:

I gained knowledge on how to use the ICT tools in implementing the standard-based curriculum through the workshop I attended which was organized by GES. During the workshop time, we were taught how to use some of the gadgets like computers and mobile phones in teaching. At first, we were lacking those skills especially how to use the computer effectively to teach the learners but with the help of the workshop we were able to learn all those things **(T 6, Field interview, 2023).**

More so, a teacher participant elucidated that:

I particularly, I have attended some training programmes or courses concerning ICT, so I gained some of my knowledge from those training programmes or courses on how to use the ICT tools in teaching and learning **(T 9, Field interview, 2023).**

One of the headteacher participants disclosed that:

One of the means that teachers rely on to gain knowledge in relation to the usage of ICT tools in curriculum delivery is through seminars or workshops. Most of the teachers in the school attended seminars where they had learnt about how to integrate and utilize ICT tools in their lesson delivery process. **(H1, Field interview, 2023).**

Deductively, workshops, seminars, and training programmes on ICT use offer upper primary teachers in selected basic schools in the Ketu South Municipality the opportunity to gain essential knowledge. Participants indicated that attending these workshops has enhanced their understanding of using ICT tools for teaching and learning. Their views suggest that upper primary teachers in the municipality do attend such training programs. This implies that some teachers gain exposure to various digital technologies through these workshops, seminars, or training sessions. This finding supports Babu (2007), cited in Judah et al. (2022), who identified IT training, workshops, seminars, and conferences as key sources of ICT knowledge acquisition.

Self-Directed Learning

Self-directed learning is the kind of learning where individuals carry out their independent learning without the help of anyone. Generally, the study also found that self-directed learning by upper primary teachers in the selected Basic Schools in the Ketu South Municipality is largely one of how these teachers gain knowledge on how use ICT tools in the delivery of the official curriculum.

One teacher participant indicated that:

Anytime that I have a lesson, and I need to do research about the necessary ICT tools, I normally visit the internet. I mostly google about the tools and sometimes I also watch videos on YouTube about how to effectively use the tool. There is this guy who always posts links about ICT tools for us to follow to watch the videos at You tube. I always follow the link to watch the demonstration video and practice about how to use the tools in teaching **(T 6, Field interview, 2023).**

Similarly, another teacher participant elaborated that:

I have basic knowledge about ICT and with the help of my mobile phone, I frequently visit the internet to read a lot about the ICT tools and how to put into use the various tools in my teaching **(T 4, Field interview, 2023).**

Additionally, a teacher participant explained that:

Apart from visiting the internet, I also rely on some ICT textbooks that are approved by the National Council for Curriculum and Assessment to gain the knowledge about some of the ICT tools for lesson delivery. Example of these textbooks approved by NaCCA are Don series, and Excellence series **(T12, Field interview, 2023).**

Also, one teacher participant concurred, stating that:

I also sometimes refer to the textbook or the course book to be abreast of what the ICT tool is and its use before I put it into use in the teaching and learning process **(T14, Field interview, 2023).**

A headteacher participant revealed that:

Teachers attend workshops or seminars to update their knowledge in relation to their pedagogical practices, they also learn on their own how to implement the curriculum by utilizing some of the ICT tools. A typical example was when I saw a teacher watching a video on YouTube about software that can be used to teach the concept reflection of objects in Mathematics **(H4, Field interview, 2023).**

The comments show that upper primary teachers in the selected public basic schools in the Ketu South Municipality commonly use self-directed learning via online platforms, internet resources, and course materials, to develop ICT skills for teaching, demonstrating curiosity and dedication to improving pupil learning. This supports findings by Shiekuma et al. (2020) and Manzo (2020), who noted teachers gain ICT knowledge through self-effort using online tools. The study also found that textbooks serve as a source of ICT learning, though their limited content means internet users may acquire more knowledge, aligning with Israel and Edesiri (2014).

Formal Education and Training

The study also disclosed that upper primary teachers in the selected Basic Schools in the Ketu South Municipality largely gain their knowledge about the integration and utilization of ICT tools in teaching and learning through formal education and training. Many of these teachers explained that they studied ICT and Educational technologies as a general course in the various training colleges or the universities that they attended respectively. These courses that they studied at the tertiary level provided them with the basic knowledge on how to use the various kinds of ICT tools in teaching and learning process.

A teacher participant exposed that:

When you talk about gaining knowledge about how to use ICT tools in teaching and learning, I gained the knowledge about those tools when I was in the training college now college of education. I learnt about some of the ICT tools in the general course that we did at the training college. Some of the things that we learnt about include Microsoft word and Microsoft excel **(T1, Field interview, 2023).**

Another teacher participant confirmed by expressing that:

At UEW, we offered a general course called educational technology and the lecturer taught us about instructional technologies. During the lecturing process, the lecturer explained to us about some instructional technologies and their applications in teaching. This course that I offered gave me the opportunity to have some basic knowledge on how to use the instructional technologies in teaching and learning **(T 6, Field interview, 2023).**

A teacher participant further reiterated that:

Well, to begin with, we were taught ICT at the college of education and the tutor spoke about some of the ICT tools. So, I had that knowledge from my facilitator during my college days. This was based on classroom teaching where we had classes in ICT lab, and we were taught how to use ICT tools in delivery of lessons. Also, a seminar was organized for us at college where they brought experts from outside and they taught us how to use the ICT tools in teaching and learning **(T 2, Field interview, 2023).**

Also, one headteacher participant commented that:

The first principal source that teachers gain knowledge on how to use ICT tools in teaching and learning is through formal education and training at universities and colleges of education. These teachers offered programmes and courses such as introduction to information communication and technology and educational technology. These programmes equipped teachers with the needed knowledge on how to use some of the ICT tools in teaching and learning **(H3, Field interview, 2023).**

The comments indicate that formal education and training were the initial sources through which upper primary teachers in the selected basic schools in the Ketu South Municipality acquired foundational knowledge on using ICT tools in teaching. Institutions like colleges of education and universities provided methodological training, and additional IT-related courses, such as educational technology, further enhanced their ability to effectively use ICT in lesson delivery. Overall, formal education is the main source of ICT knowledge for these teachers. This finding supports Beebe (2004), and Kumar and Kaur (2006) as cited in Oyedokun et al. (2018), who stated that ICT skills can be acquired through courses offered in colleges and universities.

Upper Primary School Teachers use of ICT Tools in Implementing SBC

The responses suggest that upper primary teachers in the selected public basic schools used ICT tools as teaching aids, ICT tools for information search, and ICT tools for demonstration of concepts.

ICT Tools as Teaching Aids

In relation to ICT tools as teaching aids, three sub-themes were developed with regards to participants' responses on ICT tools as teaching aids in the delivery of lessons. The sub-themes were ICT tools as audio-visual aid, ICT tools as visual aids and ICT tools as audio aids.

ICT Tools as Audio-Visual Aid in Lesson Delivery

Audio-visual aids are materials that give individuals the opportunity to concurrently see and hear about a particular activity. In this regard, the study disclosed that upper primary teachers in the selected public basic schools in the Ketu South Municipality used audio-visual aid as an ICT tool in the delivery of the lessons. They explained that they normally used videos in relation to the topic under discussion to enhance proper understanding of the concept by pupils.

One teacher participant disclosed that:

I was teaching about the concept of culture in history, I used my phone to show a downloaded video from the internet to pupils about how the various ethnic groups dress, the kind of food they eat and how they dance. For pupils to hear the sound well, I connected the phone to a Bluetooth speaker during the process **(T2, Field interview, 2023).**

In the same way, another teacher participant alluded that:

Very good, I was treating a sub-strand on traditional festival specifically this week. We looked at some traditional festivals celebrated in Ghana and after explaining about the topic, I used my phone to show a video I downloaded from the internet to the pupils on how the Gas celebrate their Homowo festival. The video was on the entire process about how Homowo festival has been celebrated **(T15, Field interview, 2023).**

A headteacher participant revealed that:

There was a time that I visited a teacher in his class, and he used laptop connected with Bluetooth speaker to present video about historical sites to the learners. After some time, he asked the learners to describe the various historical sites they saw in the video. Since there were many historical sites presented to them, the learners think about the video for some time before giving out the appropriate answer. **(H3, Field interview, 2023).**

ICT Tools as Audio Aid in Lesson Delivery

The study also identified that upper primary teachers in the selected public basic schools in the Ketu South Municipality used ICT tools as audio aids in the delivery of the lesson. The participants expressed that they used the tools to play songs in relation to the concept, teaching correct pronunciation of key words in English etc.

One of the participants revealed that:

With my Bluetooth speaker, whenever I have creative art and we are doing performance, I normally connect my smartphone to the Bluetooth speaker, and I played the indigenous songs for the pupils listen to the way the song and drumming goes. Whilst they are listening to the song and the drumming patterns, I teach them how to dance **(T3, Field interview, 2023).**

In the same vein, a teacher participant explained that:

When I was teaching performance and there was a concept about songs and dances performed by different ethnic groups, I downloaded 'agbadza' songs as an example of song performed by the ewe ethnic group. I then connected my phone to the bluetooth speaker, and I played the 'agbadza' songs with all the instruments been played and the pupils sang along. Aside this, anytime I am teaching comprehension in English Language, I have an application on my smartphone which I usually use to teach pupils the key words in the passage by using my smart phone connected to the bluetooth speaker to help pupils to learn about the correct pronunciation of the key words **(T8, Field interview, 2023).**

A headteacher participant stated that:

I observed one teacher who used ICT tools (PA system and Microphone) *in teaching and learning. During his lesson delivery, he spoke into the microphone during the lesson delivery for every learner to hear and understand the content under discussion. Aftermath, he put the leaners into groups, they think and share their knowledge on the concept presented to them using the ICT tool.* **(H4, Field interview, 2023).**

ICT Tools as Visual Aids in Lesson Delivery

The study also revealed that upper primary teachers in the selected public basic schools in Ketu South Municipality used ICT tools as visual aid in the delivery of the lesson. The participants emphasized that they used the tools to clarify concepts by showing the various ICT tools to the pupils. Also, the upper primary teachers in the selected Basic Schools explained that they show pictures to pupils in relation to the curriculum content.

One teacher participant disclosed that:

With that one, for a lesson like parts of a computer, I brought some of the parts of the computer like the computer mouse, the monitor and the system unit for the pupils to have a feel of them in the classroom and know what I meant by parts of a computer **(T11, Field interview, 2023).**

Another teacher participant elucidated that:

When I was teaching about ICT devices; for instance, gadgets that use electricity, I had to bring in the mobile phone and the laptop to show them that these are some of the devices that you need to charge with electricity for them to work **(T2, Field interview, 2023).**

Again, a teacher participant mentioned that:

When teaching the concept of diseases in science to pupils, I used my phone to show pictures of various kinds of diseases to the pupils. For instance, I showed the pupils a picture of someone vomiting and passing faeces at the same time **(T12, Field interview, 2023).**

One headteacher affirmed that:

I observed a teacher teaching about the uses of water in OWOP, she used her laptop to present some pictures to the learners. After she had presented the pictures on the laptop for some time, the learners started talking about the uses of water without her making any effort to explain the concept to them. **(H 2, Field interview, 2023).**

The comments reveal that upper primary teachers in selected public basic schools in the Ketu South Municipality use various ICT tools as teaching and learning aids across different subject areas. Tools such as mobile phones, Bluetooth speakers, and laptops are used in subjects like English, computing, creative arts, and integrated science to enhance pupils' understanding. Teachers use these tools both as direct teaching materials and as platforms to present other multimedia resources related to the lesson. While some subjects naturally support ICT integration more than others, the findings of this study contradict Oni & Uko (2016), whose research on two higher education institutions in Lagos found that ICT tools had not yet been integrated into teaching as instructional aids.

ICT Tools for Demonstration of Concepts

Demonstration as one of the techniques of teaching is essential in showing pupils how a particular activity is done by using a specific tool or material. In this regard, the study uncovered that upper primary teachers in the selected public basic schools in the Ketu South Municipality used ICT tools to demonstrate some curriculum content in the lesson delivery. These teachers explained that they used ICT tools to demonstrate practical lessons and other topics which needed the use of ICT tools for demonstration.

A teacher participant expressed that:

The last time, I was teaching about past and present and how the people communicate as a topic in English Language. I used my mobile phone to demonstrate to pupils how to pass on information in the modern era by making calls and putting message across. After that, I then showed my mobile phone to the pupils that this tool is one of the modern tools that we use to communicate **(T14, Field interview, 2023).**

Another teacher participant mentioned that:

When I was teaching a sub-strand like energy and specifically types of energy in integrated science, I brought a radio to the classroom to demonstrate the concept of sound energy. I turned on the radio and it started making sounds. I asked pupils what they heard, and they mentioned sound from the radio **(T12, Field interview, 2023).**

More so, one teacher emphasized that:

During our practical lesson on how to create folders in computing, I took pupils to the ICT lab [laboratory], and I demonstrated to them about how to create folders by using the desktop computer in the lab. Aftermath, I allowed them to also practice what I demonstrated to them **(T11, Field interview, 2023).**

In affirming the views of the teachers, a headteacher participant indicated that:

I visited a teacher during the instructional period to observe her teaching, and I realized that she was using an ICT tool to support her explanation. With the use of this tool in her teaching and learning process, she demonstrated the concept of booting in computing for the learners to observe **(H1, Field interview, 2023).**

The comments from participants showed that upper primary teachers in selected Basic Schools in the Ketu South Municipality use ICT tools to demonstrate curriculum content to pupils. This reflects a pedagogical approach that values ICT for enhancing teaching and learning. The hands-on, experiential use of these tools helps students understand subjects better and makes lessons more engaging and relevant. Teachers' willingness to adopt ICT also shows their commitment to providing effective, modern education. The choice to use ICT is influenced by the subject matter and teacher preferences. This finding aligns with Abedi (2023), who found that teachers use ICT tools to demonstrate curriculum content across subjects, and with Buabeng-Andoh and Yidana (2015), who noted that many science teachers use ICT to demonstrate science concepts in class.

ICT Tools for Information Search during Lesson Delivery

ICT tools play a crucial role in enhancing the efficiency and effectiveness of research in all levels of education. In this vein, the study uncovered those upper primary teachers in the selected Basic Schools in the Ketu South Municipality used ICT tools for searching information in the context of the lesson delivery. The participants expressed that sometimes during the lesson delivery, the need arises for them to search for information online and show them to the pupils. They further explained that the information is sometimes in the form of videos, audios and images etc.

A teacher participant disclosed that:

Even though I normally do research to get information before going to class to teach, sometimes during the delivery of the lesson, I use my smartphone to search for information online to support the lesson as the need arises. This information is occasionally videos or images relevant to the concept under discussion. A typical example was the video about the combined harvester. It was during the lesson delivery that I searched for the video to support the lesson. **(T4, Field interview, 2023).**

Another teacher participant reiterated that:

In mathematics, I was teaching about how to find the highest common factor of numbers. So, with the method I was using, I realized that the pupils were finding it difficult to understand the concept so during the lesson delivery process I quickly took my smartphone, and I googled about other strategies for teaching the highest common factor of numbers. **(T11, Field interview, 2023).**

Also, one headteacher added that:

Almost all the teachers in my school use ICT tools to search for information during their lesson preparation stage. This helps them to gather information relevant to the subject matter. However, I have not seen any teacher using ICT tools to search for information during the teaching and learning process even though it is likely to happen. **(H3, Field interview, 2023).**

The comments indicate that upper primary teachers in selected public basic schools in the Ketu South Municipality use ICT tools to search for relevant information during lesson delivery, especially when they need to clarify concepts with concrete evidence. Some teachers also use ICT to find alternative pedagogical strategies to help pupils better understand the lesson. This suggests that in-lesson information searching varies depending on the teacher. However, this finding contradicts Abedi (2023), who stated that while teachers do use ICT tools for information searches, it typically occurs during the lesson preparation stage to enhance instructional quality with up-to-date content.

V. Practical And Policy Implications

The study's findings underscore the relevance of teachers' source of knowledge regarding their effective and efficient use of ICT tools in curriculum implementation. Based on the findings, it is explicit to state that teachers' effective use of ICT tools in teaching and learning is majorly dependent on their level of knowledge. This suggests the importance of providing teachers with training and support to effectively integrate ICT tools into their teaching practices. More so, as teachers rely on seminars or workshops, formal education and collaboration to acquire ICT skills, it is paramount for educational authorities to organize targeted continuous professional development programmes for the teachers. These should be based on the practical utilization of ICT tools in curriculum implementation.

For policy, given credence to collaboration among teachers' and with IT professionals as the principal source of teachers' acquisition of knowledge in relation to the usage of ICT tools in curriculum execution, there is the need for policymakers to incorporate and promote inter-school and intra-school learning networks. This

could include developing procedures for collaborative ICT learning hubs by pairing tech-savvy teachers with other teachers seeking support in relation to the use of the ICT tools in curriculum delivery.

VI. Conclusions

The findings conclude that upper primary teachers in the selected public basic schools in the Ketu South Municipality rely on various sources to acquire knowledge about ICT tools, reflecting a proactive effort to enhance their ICT skills for effective SBC implementation. Among the sources, collaboration with colleague teachers, ICT teachers, and IT professionals stands out due to their accessibility. The study also concludes that upper primary teachers use ICT tools for information searches, concept demonstrations, and as teaching and learning resources in the implementation of the SBC. The integration is supported by using devices like smartphones, laptops, projectors, audio-visual aids, and internet-based tools, with smartphones being the most used. This demonstrates that upper primary teachers in public basic schools in the Ketu South Municipality are actively incorporating ICT tools into their teaching, supporting the SBC's goal of fostering interactive and engaging learning.

VII. Recommendations

Based on the findings, the following recommendations are made:

1. To support teachers in acquiring ICT-related knowledge and skills, educational authorities in the Education Directorate of the Ketu South Municipality should regularly organize workshops and seminars focused on ICT tools to assist upper primary teachers in integrating them into teaching. Additionally, professional learning community sessions on ICT should be strengthened through consistent discussions and idea-sharing among teachers. This would allow knowledgeable teachers to share their expertise, creating a supportive environment that promotes skill development among peers with less experience in using ICT tools.
2. To improve teachers' use of ICT tools in implementing the SBC, educational authorities in the Ketu South Municipality should introduce structured and ongoing professional development (PD) programmes that move beyond one-time workshops. These PD programmes should be practical, hands-on, and aligned with the specific needs of teachers under the SBC. They should include real classroom applications with local examples, and incorporate mentorship or peer-learning, where experienced or tech-savvy teachers support others through collaborative planning, co-teaching, or demonstrations. Furthermore, the PD programmes should cover both the technical and pedagogical aspects of ICT tools to help teachers effectively use them in lesson planning, teaching, and assessment.
3. For long-term effectiveness of PD programmes, educational authorities should regularly assess the impact of these training programmes with teacher feedback guiding future improvements. Recognition and incentives such as certifications or awards should be used by the Education Directorate of the Ketu South Municipality to motivate teachers to apply what they have learned and innovate in their classrooms. Furthermore, educational authorities in the municipality should see to it that the necessary infrastructure, such as access to devices, reliable internet, and ongoing technical support, are in place. With a combination of skill-building, mentorship, contextual relevance, and adequate resources, teachers will be better equipped to use ICT tools efficiently and effectively in delivering the SBC.

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