Leadership and Policy in Schools

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/nlps20

Headteachers' Support and Challenges Toward ICT Integration into Teaching and Learning in Ghanaian Basic Schools

Dora Atswei Lomo, Usman Kojo Abonyi & Doreen Ahwireng

To cite this article: Dora Atswei Lomo, Usman Kojo Abonyi & Doreen Ahwireng (12 Feb 2024): Headteachers' Support and Challenges Toward ICT Integration into Teaching and Learning in Ghanaian Basic Schools, Leadership and Policy in Schools, DOI: 10.1080/15700763.2024.2317300

To link to this article: https://doi.org/10.1080/15700763.2024.2317300

LEADERSHIP AND POLICY IN SCHOOLS
https://doi.org/10.1080/15700763.2024.2317300

Routledge
Taylor & Francis Group

Headteachers' Support and Challenges Toward ICT Integration into Teaching and Learning in Ghanaian Basic Schools

Dora Atswei Lomo[a], Usman Kojo Abonyi[b], and Doreen Ahwireng[b]

[a]Ridge Church School, Accra, Ghana; [b]Department of Educational Studies and Leadership, University of Ghana, Accra, Ghana

ABSTRACT

This study explored headteachers' support toward ICT integration into teaching and learning and the challenges they face in offering such support. By employing a qualitative research paradigm, the study interviewed 10 headteachers and 10 ICT-trained teachers from one education district in the Greater Accra Region. Findings generated from a thematic analytical technique showed that the headteachers supported ICT integration into teaching and learning by organizing and supporting teachers in ICT-related trainings, monitoring and supervising teachers, providing and mobilizing ICT infrastructure, and maintaining the ICT infrastructure. However, inadequate funds to support the procurement of ICT equipment, lack of stakeholder support in mobilizing ICT resources, difficulty in training teachers, unavailability of electricity and internet facilities, and high maintenance costsconstrained headteachers' efforts in supporting ICT integration into teaching and learning. The study concludes that for headteachers to successfully support ICT use among their teachers, pragmatic steps must be taken by policymakers to address the challenges they face in providing such support.

Introduction

The use of Information and Communication Technology (ICT) has become a major driving force in transforming the global education landscape (Asad et al., 2021) and has an influential effect on the teaching and learning processes (Asamoah, 2021; Muir-Herzig, 2004). While preparing students to better compete in the global knowledge economy (Kundu & Bej, 2021), ICT-driven education creates opportunities for teachers and students to adapt teaching and learning to individual needs (Afari et al., 2023; Hu, 2017). It promotes creativity, expands access to learning resources, keeps students socially active, and enhances learner participation (Asamoah, 2021; Jogezai et al., 2022). In addition, it enables physically impaired and cognitively challenged students to engage in learning electronically and in a variety of forms (Hu, 2017).Further, it provides a flexible design of lessons and facilitates self-directed and lifelong learning at any location and time (Afari et al., 2023; Asif et al., 2020).

Despite the importance of ICT in contemporary society and educational systems (Lawrence & Tar, 2018), ICT can be a distraction, disconnect students from face-to-face relationships, restrict their creativity, provide inappropriate access, offer false information, cause students to use unreliable resources for learning, make cheating easier, and undermine students' need for work and discipline (Borysiuk, 2013; Vargas-Montoya et al., 2023). Moreover, many unavoidable and unanticipated ethical concerns such as infringement upon individual privacy rights, cyber security threats, misuse of ICT for pointless things, and health problems arise when using ICT (Thaheem et al., 2022). Thus, educational institutions are expected to create the necessary conditions that would maximize the benefits of ICT

CONTACT Usman Kojo Abonyi uabonyi@ug.edu.gh Department of Educational Studies and Leadership, University of Ghana, P. O. Box LG 1181, Legon, Accra, Ghana

and mitigate the potential harms associated with ICT usage (Agyei, 2013; Vargas-Montoya et al., 2023).

While a number of factors influence ICT integration into teaching and learning (Lawrence & Tar, 2018), research considers educational leaders among the most influential actors in the implementation of ICT integration in schools (Jogezai et al., 2022; Schiller, 2003). Factors such as teacher preparedness, access to computers, network and internet access, provision of training to educators, provision of ICT-based curriculum resources and technical support are important for implementing ICT in education (Buabeng-Andoh, 2019; Lawrence & Tar, 2018). However, it is the leadership that engages the acquisition and coordination of these factors within the school environment (Hu, 2017; Kundu & Bej, 2021). Headteachers (principals) create the enabling environment in schools to foster meaningful integration of ICT and challenge teachers to learn to use technologies to improve teaching and learning (Boulton, 2017; Flanagan & Jacobsen, 2003). Schiller (2003) opines that "without the leadership support, the educational potential of information and communication technology may not be realized" (p. 171).

Yet, "an area which is noticeably absent in research on ICT implementation and integration is the role of the school principal" (Schiller, 2003, p. 171). Little research has been conducted to explore the support that headteachers offer teachers toward the integration of ICT into teaching and learning in schools and the challenges they face. Buabeng-Andoh's (2019) study in Ghana which sought to establish the factors that influence ICT use of teachers in Senior High schools (SHS), found that leadership support was the most significant predictor of ICT use. While the study result provided sufficient evidence that effective integration of ICT into teaching needs school leadership support, few studies (if any) have explored the kind of support that headteachers offer their teachers toward ICT integration into teaching and learning. This study attempts to fill that gap by exploring the support headteachers offer toward the integration of ICT into teaching and learning and the challenges they face in providing such support in Ghana, a developing country context. The study addresses the following research questions:

(1) What support do headteachers offer teachers in the integration of ICT into teaching and learning in schools?
(2) What are the challenges that confront headteachers in offering support to teachers in the use of ICT to enhance teaching and learning?

In this study, ICT refers to electronic devices or technological equipment for collecting, processing, storing, retrieving, and communicating information (Zuppo, 2012) while the "integration" of ICT into teaching and learning refers to the application of technology to aid student learning (Grabe & Grabe, 2007). The next section of the paper presents the Ghanaian ICT in education context and that is followed by a review of related literature and the theoretical framework of the study. The methodology, results, discussion, conclusion and recommendations, and study limitations follow accordingly.

The Ghanaian Context: ICT in Education Policy Landscape

The government of Ghana recognizes the importance of integrating ICT into the education system to enhance teaching and learning outcomes (Asare et al., 2023). Consequently, a number of policy frameworks have been formulated by the government of Ghana to promote the use of ICT in education over the past years (Adarkwah, 2023; Asare et al., 2023; Gunu, 2022).

The first national policy on ICT in Ghana dubbed "Ghana ICT for Accelerated Development" (ICT4AD) policy was developed in 2003. With 14 pillars including the promotion of ICT in Education (Gunu, 2022), the policy aimed at promoting an improved educational system driven by the deployment and utilization of ICT (Asare et al., 2023). The second national policy on ICT was the ICT in Education Policy developed in November 2008. The policy sought to provide a platform for graduates to self-confidently utilize ICT skills to construct meaning, knowledge, and initiate innovative

technological inventions (Ministry of Education, 2008). The ICT in education policy developed in 2015 was the third to be developed by the government. This policy was hinged on three pillars, namely ICT as a learning and operating tool, integration of ICT into teaching and learning, and ICT as a career opportunity for students. The introduction of ICT at all levels of the Ghanaian education curriculum was seen as an important means of sustaining the integration of ICT and stimulating the interest of students (Ministry of Education, 2015).

The integration of ICT into teaching and learning has also received much attention in the various Education Strategic Plans (ESP) (2003–2015; 2010–2020; and 2018–2030) of the Ministry of Education. For example, the ESP (2003–2015) sought to promote ICT in schools and institutions of higher learning. Among other things, the government sought to provide appropriate ICT training opportunities at all levels of education, develop a cadre of trained persons to support the delivery of ICT in schools, and provide access to the Internet (Ministry of Education, 2003). Similarly, the Education strategic plan (2018–2030) sought to provide relevant opportunities for ICT and skills development with well-supplied ICT facilities (Ministry of Education, 2018).

To implement the ICT in education policy objectives, successive governments have rolled out a number of policy interventions. In 2011, the MOE in partnership with RLG Communications, an ICT company in Ghana, launched the Basic School Computerization Project to create a platform to enhance pupils' skills in ICT. The project aimed at giving 60,000 computers to schools and train teachers who would further teach the pupils. The Ministry of Education (MoE) also collaborated with the Ministry of Energy to extend electricity to deprived schools that had no electricity supply (GhanaWeb, 2011). Other initiatives include making the study of ICT compulsory at all levels of education, distribution of laptops to teachers, distribution of computers to selected schools, training of teachers on the use of ICT, and installation of wireless Internet facilities in selected Senior High Schools, Colleges of Education, and Nursing Training Colleges across the country (Asare et al., 2023; Gunu, 2022).

Despite the number of ICT in education policy frameworks, past studies highlight a number of challenges hindering the effective integration of ICT in Ghanaian schools. For instance, while the policy frameworks sought to make available and accessible adequate ICT infrastructure and resources, several schools lack access to ICT infrastructure because of financial constraints and inadequate government support (Asare et al., 2023; Gunu, 2022). Also, while existing ICT in education policies underscore teacher training in ICT, such initiatives often fall short of addressing the specific needs of teachers in ICT integration (Asare et al., 2023). Within this context, this study sought to investigate how headteachers (principals) support the integration of ICT in their schools and the challenges that confront them in the process.

Literature Review

How School Leaders Support ICT Integration

Studies in the field of educational leadership have been emphatic on the significant role that principals play toward ICT integration in schools (Flanagan & Jacobsen, 2003; Schiller, 2003). As instructional leaders, principals are to ensure that technology is incorporated into the teaching and learning process (Boulton, 2017; Shin, 2015). Principals need to promote a school culture which encourages exploration of new technologies in teaching and learning, understand the capacities of the new technologies, and be adept users of technology (Schiller, 2003). They are to expedite the needed support and promote plans and visions on instructional use of ICT (Ottestad, 2013).

The integration of ICT in schools would be fruitful when the leader supports by providing modern infrastructure, sufficient training, encourages staff to integrate ICT into teaching and implements ICT programs in their schools (Afari et al., 2023; Buabeng-Andoh, 2019; Flanagan & Jacobsen, 2003). School leaders need to provide relevant ICT infrastructure to enhance the integration of ICT in their schools (Aydin et al., 2016). The provision of adequate and state-of-the-art ICT infrastructure will

encourage teacher learning because teachers will learn as they use these facilities in the teaching process (Boulton, 2017; Lawrence & Tar, 2018). They need to involve all stakeholders in the provision of ICT infrastructure in their schools and lobby for government support to provide infrastructure for the integration of ICT in their schools (Asad et al., 2021; Schiller, 2003).

Research on technology leadership behaviors of school leaders reports that the behavior of school leaders plays a major role in the integration of ICT in schools (Anderson & Dexter, 2005; Mwawasi, 2014). A positive behavior of school leaders will reflect in the way they use technology and in the way they encourage others to use it (Flanagan & Jacobsen, 2003; Schiller, 2003). To bring about the desired transformation through ICT usage, school leaders need to have a vision and a plan for integrating ICT in their schools.

School leaders must also show some basic understanding of ICT so that they can perform their responsibilities effectively and efficiently and motivate teachers to integrate ICT into their lessons (Gurr, 2000; Pius et al., 2019). When the teachers observe that their leaders are making good use of technology, they would be inspired to incorporate it in their lessons.School principals need to capacitate themselves with the knowledge of modern technologies to foster a school culture of exploring new teaching and learning techniques through ICT integration (Afari et al., 2023).

Challenges of Implementing ICT in Education

The implementation of ICT in schools is perceived by principals to be complex and fraught with several difficulties (Mogwe & Balotlegi, 2020). While ICT requires certain facilities to be available before implementation, this is often not the case in most schools (Hennessy et al., 2010; Lawrence & Tar, 2018). There are infrastructure challenges like inadequate classrooms or buildings to house ICT facilities in many schools, absence of electricity, lack of computer desks, network configuration problems, technical faults, and lack of ICT facilities like ICT hardware, software, and Internet (Hennessy et al., 2010; Kundu & Bej, 2021; Mingaine, 2013). Access to and maintenance of appropriate hardware and software, apprehension about personal computer use, providing appropriate staff development programs, and coping with strategic planning processes required to integrate ICT into teaching, learning and management practices have been found as other concerns confronting principals in supporting ICT integration in schools (Hennessy et al., 2010; Schiller, 2003).

Some other drawbacks to implementing ICT in schools are lack of teacher time, limited access, inadequate teacher training and the lack of expertise (Flanagan & Jacobsen, 2003; Mogwe & Balotlegi, 2020; Muir-Herzig, 2004). Other challenges like duties and taxes imposed on ICT products and inadequate funding from the government have made it impossible for poor schools in developing countries to implement ICT effectively in their schools (Makhanu, 2010).

Theoretical Framework

This study employed the Technology Acceptance Model (TAM) as the theoretical lens. The model, which has been used widely by researchers in the field of technology in education, postulates that a user's attitude toward technology is a function of two key beliefs, namely: perceived usefulness and perceived ease of use (Davis, 1989). The perceived usefulness of technology relates to the conviction among users such as headteachers and teachers that it will make their work or that of their learners easier thus enhancing job performance (Luhamya et al., 2017). This means that if headteachers and teachers think that the use of computers would make their day-to-day activities more organized and effective, then they would probably use them. The perceived ease of use of new or existing technology would mean that the users view technology as one that does not require a lot of effort to learn how to use (Venkatesh & Davis, 2000). This suggests that headteachers and teachers would possibly adopt technology that they consider easy to learn and use with minimal need for expert consultation. In this study, we hypothesize that if headteachers believe that using ICT will enhance teachers' performance, improve teaching and learning outcomes, and increase the efficiency and effectiveness of teachers in

schools, they would offer the necessary support for teachers to integrate ICT into teaching and learning.

Methodology

Research Approach and Setting

This study adopted the interpretive research paradigm. It sought to provide an in-depth understanding and insights of the issue under exploration and not to make generalizations from the examined participants. This approach was best suited for the study because the study was exploratory in nature, and it allowed to deeply describe and analyze how headteachers provide support toward the integration of ICT into teaching and learning in schools and the challenges they faced in offering such support.

The study was carried out in the Korley Klottey Municipality of the Greater Accra Region of Ghana. The study was conducted in the municipality because the Municipal Assembly places a high priority on improving the ICT space of the Municipality through playing the role of a facilitator in addressing the challenges facing the sector (Korle-Klottey Municipal Assemply, 2020). The action plans of the municipality deliberately make room for the provision of ICT infrastructure for education by providing ICT equipment and organizing Science, Technology, Engineering, and Mathematics (STEM) clinics. It was therefore imperative to study the support school leaders offer toward ICT integration in such an environment.

Sample and Sampling Technique

The population for the study comprised all headteachers and teachers in the public and private basic schools in the municipality. Basic education in Ghana comprises pre-primary (2 years), primary (6 years) and junior high school (3 years) levels and targets children between the ages of 4–15 years. Since the study was exploratory in nature and yet all the headteachers were expected to ensure the integration of ICT into teaching and learning in their schools, the researchers felt that each headteacher could serve as a potential participant in the study. We therefore served all headteachers the introductory letter obtained from the Municipal Education Directorate and requested them to willingly express their interest to participate in the study.

Following this, we called on the first 15 headteachers who expressed their interest and finally interviewed 10 of them. This was informed by the principle of saturation which demands that, few participants are engaged in an in-depth interview with deep probing for more data to the extent that the researcher stops the interview process when the additional interview would not add any further insight (Smith et al., 2009). Additionally, we employed the judgmental sampling strategy (Patton, 2002) to select the ICT-trained teachers in each of the ten selected schools. The ICT-trained teachers in each of the selected schools were considered experts who have good knowledge and understanding of the subject-matter and would provide rich information to specifically address the issues under exploration. Thus, 20 participants made up of ten headteachers and ten teachers were interviewed. The ten headteachers consisted of 5 females and 5 males, possessed a minimum qualification of a university degree, their ages ranged from 35 to 55 years, and had served at least 5 years in their role as a headteacher. The ICT-trained teachers also comprised 7 males and 3 females, possessed a university degree, and had an average age of 26 years.

Data Collection Methods and Data Collection Procedure

The data collection method used in this study was semi-structured interview. The choice of semi-structured interview as a data collection method gave the researchers more control over the topics and questions of the interview (Cohen et al., 2007). It further provided opportunity

for the participants to freely express themselves and provide detailed insight into the issues under exploration. An interview guide guided by the literature review was prepared. Some of the main questions asked were "how do you promote ICT integration into teaching and learning in your school? What factors impede your effort in supporting ICT integration in your school?

With reference to the data collection, we first secured an introductory letter from the Municipal Education office which was sent to all schools in the municipality. The headteachers and ICT-trained teachers sampled were contacted to schedule dates and times convenient to them for the interviews. All the interviews were conducted face-to-face in the schools and after school hours. This was to ensure that the research did not disrupt instructional programs in the schools. Audio recordings were taken with the consent of each participant. Field notes were also taken during the interview sessions. On average, each interview session lasted for about 40 minutes.

Data Analysis

The data was analyzed using Braun and Clarke's (2006) procedure for thematic analysis. Data was transcribed manually and was read and reread to ensure that the researchers became familiar with the data provided. Various phrases relevant to the research questions were highlighted in different colors corresponding to different codes that emerged from the data. Initially generated codes were organized into two broad themes in connection with the two research questions guiding the study. All data relevant to each theme was gathered. The meaning of each theme was questioned to ensure that the focus of each theme was maintained, and the themes directly addressed the research questions. Findings from the data were reported in such a way that the themes were logically connected and meaningful to tell a consistent story about the data.

Ethical Considerations and Ensuring Trustworthiness in the Study

The researchers first sought ethical clearance from the [Blinded for Review] Ethics Committee for Humanities (ECH) and obtained an introductory letter from the Korle Klottey municipal education directorate which gave us access to all schools in the municipality. The participants were informed ahead of time and their consent was sought before the data collection. To ensure anonymity, pseudonyms were assigned to each of the participants. Participants were made aware that if they wanted to withdraw from the study, they could do so.

To ensure the trustworthiness of the research process, a copy of the transcripts was sent to participants to check if the information on the transcript matched with the information they provided. The researchers also kept a reflexive journal during the entire data collection process.We further used an audio-recording device to record interviews to identify the actual reality of the interviews and avoid discrepancies in the data collected. This process helped to enhance the quality and accuracy of the transcripts (Creswell & Poth, 2018; Kleven, 2007).

Results

The results generated from the study are presented under the two broad themes: Headteachers' support toward ICT integration into teaching and learning and the challenges headteachers face in supporting teachers toward ICT integration.

Headteachers Support Towards ICT Integration into Teaching and Learning

The analysis of participants' responses to headteachers' support toward ICT integration into teaching and learning generated four sub-themes: provision of ICT-related training, monitoring and supervision, provision of ICT infrastructure, and maintenance of ICT tools and equipment.

Provision of ICT-Related Training as a Support from Headteachers

The study showed that headteachers supported the integration of ICT into teaching and learning by initiating and organizing ICT-related training for teachers. The headteachers reported that such training programs were either facilitated by ICT-trained teachers or they engaged the services of experts outside the school. Headteachers, mostly in the private schools, also supported teachers to attend external workshops paid for by the school. The training programs covered how to use hardware tools like the interactive smartboard, projectors, and the computer, how to use ICT to assess and grade students and how to use software applications like Google suite and Microsoft tools. Headteachers in government schools asserted that some of the external ICT-training programs were organized by the Ghana Education Service. They had also initiated school-level training in the form of professional learning communities organized once a week to help teachers refresh themselves and improve their pedagogical skills in ICT integration. The training was organized by the headteachers but facilitated by the ICT-trained teachers in the school. For instance, Headteacher 5 asserted that:

> With the new curriculum, we have a day of the week that is used to refresh ourselves. So, during that period, I organize my teachers and ask the ICT teacher and those who are proficient in ICT to educate teachers that have challenges. It is a sort of in-service training I put together to help teachers refresh themselves in ICT.

Headteacher 1 from a private school also stated that:

> I have organized training on the use of google classrooms for my teachers, they also learnt about the use of Zoom, PowerPoint presentations and then using ICT in report writing. They have received training on how to use Education.com, it's an education app from the United States and we use it to solicit for content in English Language, Science and Mathematics. I organised a virtual training with a facilitator form the United States of America who trained teachers on how to access information such as lesson notes preparation and how to teach certain lessons by downloading videos from the Education.com.

Responses from the teacher participants confirmed that they received support in the form of in-house (school level) and external training. They reported that training programs centered on how to use both hardware and software tools like computers, Microsoft Office tools, projectors, and interactive boards to teach, grade, and assess learners. It emerged that the school level training was organized by their headteachers with facilitators from the school or external sources. For instance, Teacher B commented that:

> We have been trained in the best use of the smart boards, how to make effective use of it and explore all the tools that come with it to facilitate teaching and learning. Also, we are being introduced to a software called Education. com where teachers are able to visit that site and download lesson plans, worksheets, exercises and activities that make teaching and learning interesting. Some of the training sessions we have attended are TIME conference and Neo genics. We were trained on how to integrate ICT into our lessons.

Teacher H who teaches in a public school also commented that:

> We have attended a number of training workshops. We were trained at Academic City College. We have certificate on basic computing skills and also, we were introduced to the Microsoft word, excel and PowerPoint presentation. Then recently we went for a workshop, we were introduced to an application that will enhance our assessment. We have received enough training from the municipal, spearheaded by our head.

However, some teachers shared that although they had some form of training, it wasn't frequent. For instance, Teacher N reported that "yes, she does that but it's not frequent. We have had training on how to assess students on the new curriculum using ICT. That is all that we have done." Teacher O also added that, "we have done training once, that was a long time ago, but it was only a few teachers who went for that training organized by the district. That is all."

Monitoring and Supervision

According to the headteachers, they observed their teachers whilst they were teaching. As part of the lesson observations, they ascertain whether and the extent teachers incorporate ICT into their lessons. The monitoring also was in the form of soliciting feedback from students on the

various ways teachers used ICT in their lessons. Headteacher 7 reported that, " . . . we sit in the classrooms to observe, the assistant headteacher and I walk into classrooms to see how teachers are using ICT skills they have acquired in their teaching." Similarly, Headteacher 2 also mentioned that:

> When teachers are teaching, we go and observe their teaching and we appraise them on the things we observe. From the lesson preparation to the lesson delivery, we observe them to see if they are using ICT tools and the knowledge acquired from the training.

To corroborate the responses from the headteachers, the teachers confirmed that they were monitored and supervised by their heads during their lessons through class observations and feedback from students. For example, Teacher J noted that "the headteacher comes round to observe our lessons. Sometimes, the headteacher privately calls students to inquire whether the teacher infuses ICT into teaching and learning or not."

Provision of ICT Infrastructure

Provision of infrastructure emerged as another form of support that headteachers provided to teachers to stimulate ICT integration into teaching and learning in their schools. While some private school headteachers gave teachers loans to buy hardware tools, others provided internet data and furnished the ICT labs with projectors, computers, and internet facilities for their teachers. On the part of headteachers in public schools, they reported that they either bring their personal ICT tools to be used by the school, borrow ICT tools from the community, or hire tools from friends and family to support their teachers. They further explained that the teachers had to always inform them ahead of time of their intentions to use these ICT tools in their lessons to enable them to get the ICT equipment. They further added that, sometimes the source of funding for infrastructure support like the provision of batteries for laptops and provision of internet data for teachers was either from internally generated funds or from the capitation grant. Headteacher 7 for instance commented that, "I either borrow or hire a projector for my teachers. Sometimes I fall on the Presbyterian church or friends to do that. I use my own money, or the capitation grant to pay for the hiring."

The result further showed that headteachers engaged external stakeholders to help procure ICT infrastructure for the school. Headteachers asserted that the stakeholders they engaged included the school's board, NGOs, companies within their communities, past students, the chief, Parent Teacher Associations (PTA), the Municipal Assembly, the Ghana Education Service, the church in the community and foundations. They further revealed that engaging with these stakeholders has led to the procurement of ICT hardware tools for their schools. While some of these organizations have donated computers, laptops and projectors to the schools, others have refurbished ICT labs for the schools. Headteacher 10 recounted that:

> For the computers we have now, it was the chief of Osu who donated them to us. Also, GES donated laptops for the French Lab. A company in the neighbourhood donate the smartboard and the projector to us.

Headteacher 4 also indicated that, "when you visit our lab, we have discarded a number of the machines we started with. About a month ago, the old students furnished the computer lab with over 40 laptops for the school to use."

To corroborate the responses of the headteachers, the teacher participants reported that the infrastructural support they received was in the form of internet facilities and hardware tools. For instance, Teacher E indicated that "the headteacher supplies us with internet. She has given us computers and a projector to use for demonstration." The teacher participants further confirmed that their headteachers engaged other stakeholders to mobilize ICT equipment for their school. For instance, Teacher H reported that, "the headteacher has some affiliation with some NGOs so they came to donate these gadgets to us. As soon as we informed her, she submitted an application to the NGOs and we were lucky to receive these from them."

Maintenance of ICT Infrastructure

The fourth support headteachers provided was in the form of maintenance of ICT hardware and software tools. While some headteachers (mostly from private schools) shared that they had their own internal team of ICT experts that took care of maintenance, others reported that they contacted the services of external ICT hardware and software experts to help them maintain their equipment. It emerged that payment for the maintenance services came from the school fees, capitation grant, or from internally generated funds. Headteacher 1 commented that:

> The school has also employed ICT experts who are into hardware. From time to time, they come to inspect and service the machines. Where the machines are no longer in good use, we dispose them off and get new ones. They ensure that the machines are always maintained from time to time.

Also, Headteacher 5 commented that:

> It is the school that maintains our gadgets when the breakdown. We send it to external experts for servicing. The school pays for it, we have our internally generated funds and then we have our capitation as well. So, either our capitation, or our internally generated funds helps us to do those things.

The teacher participants confirmed that they indeed received support from their headteachers in the form of maintenance. Some commented that the school relied on the ICT teachers or ICT experts in their school to maintain equipment while others mentioned that they collected money from their headteachers to repair damaged equipment. For example, Teacher A indicated that, "we have the ICT team in the school whose main job is to service malfunctioning ICT equipment or attend to us when we have challenges."

Challenges Headteachers Face in Supporting ICT Integration into Teaching and Learning

This section presents the results on the challenges headteachers face in offering support toward ICT integration in their schools. Analysis of the data revealed 4 sub-themes: financial challenges, challenges in offering training, challenges in ICT infrastructure provision, and maintenance challenges.

Financial Challenges

Majority of the participants reported that the challenge they faced was mainly financial challenges, that is securing funds to support ICT related projects. Some headteachers lamented that their school did not have enough funds to support their teachers to purchase laptops for their personal use. They further complained that because of the depreciation of the cedi, prices of some of the ICT tools they needed had increased making it difficult for them to purchase some of the tools on their budget. For instance, Headteacher 6 complained that:

> Sometimes, prices of the ICT tools increase so much that what you have budgeted for, you are unable to get them. Now that the dollar is high and the cedi has depreciated, it makes us pay more for the same service.

Some participants further indicated that, due to financial challenges, they had to resort to soliciting funds from stakeholders within their community and that has not yielded positive results. Others also reported that sometimes they had to make impromptu purchases within the term but found it difficult to do so due to financial challenges.

Other headteachers, mainly those in the public schools, shared that the Capitation Grant they received was not enough. Besides, they do not receive the grant on time and due to other pressing needs of the school, it made it difficult to have enough funds to support ICT-related projects in the school. Due to this challenge, some headteachers lamented that they had to resort to using their own money to prefinance resources for ICT related projects.

Challenges in Providing ICT- Related Training

The headteachers also shared the challenges they faced in training teachers in ICT-related programs. Some headteachers reported that they found it expensive to train their teachers. Some complained that it was expensive to bring in external trainers to train their staff. Some participants also complained that they found it difficult to train some of their teachers because of their age. They reported that such teachers were old and found it difficult and reluctant to use technology, hence lacked interest in participating in ICT training. Headteacher 5 commented that:

> Sometimes there will be the need to bring an expert to come and train teachers, but if you are bringing an expert, it will be at a cost. The school does not have those financial resources. That is why we use our own internal people to help.

Other participants also reported that while some of their teachers were not interested in trainings concerning ICT and always found excuses to drop out of training programs, others did not attach seriousness to the training programs because they felt such programs were not necessary since they knew how to use a computer. For instance, Headteacher 3, mentioned that "you have teachers to be trained and then just a few show up because they think it is ICT. They do not put in a lot of effort, or seriousness when it comes to ICT because they think they already know."

Challenges in Providing Infrastructural Support

Headteachers reported that they faced challenges in providing infrastructural support to aid ICT integration in their schools. They commented that they have few ICT facilities in their schools for ICT integration. In addition, they reported that some of the few ICT facilities had broken down so students could not use them. This challenge was apparent in a comment from Headteacher 6:

> My number one challenge is lack of facilities. We have the building, but we are left with the tools. I have written several letters to the district education office, but we have not received anything yet. I have also written to Compu Ghana but no response. I have mentioned it to parents at PTA meetings, but they do not have the resources to help us.

Also, Headteacher 1 explained that:

> Some of the machines we use are archaic, getting the parts when some of the parts are not working is a big challenge because the tools we bought earlier are no longer in the system. We are unable to get the parts to buy so we have to change it and it is expensive.

Other participants mentioned lack of electricity and internet facilities as some of the challenges they face in supporting ICT integration into teaching and learning in their schools. For example, Headteacher 10 commented that "another challenge we have is that there is no electricity in this school and no internet facility. Teachers have to use their own data."

Challenges in Maintaining ICT Tools

With respect to maintaining ICT tools, headteachers reported that they faced challenges in maintaining broken-down equipment due to inadequate funds, high cost of maintaining equipment, delays on the part of the technicians and difficulty to get some of the parts of the machines to buy. For instance, Headteacher 2 commented that "well sometimes when the tools breakdown, you want them fixed as early as possible, but you do not get it like that. You call the technician and they do not report immediately to fix the problem." Headteacher 5 also revealed that"with our limited funds, we continue to have challenges. Because nobody will maintain it for us for free, we have to pay for the maintenance. So as and when we have funds, then we do it." Other headteachers also reported that they found it difficult to maintain their equipment because their teachers used it for their personal interest instead of using it for school activities.

Discussion

This study explored the support that headteachers offer teachers toward the integration of ICT into teaching and learning in schools and the challenges they face in a developing country context. Results

obtained from the study showed that the headteachers supported teachers by initiating and providing ICT-related training to improve their competencies in the use of technology in the classroom. While some of such programs were organized at the school level and facilitated by ICT-trained teachers or experts outside the school, teachers were also supported to attend external programs sponsored by the school. The training programs covered how to use hardware tools like the interactive smartboard, projectors, and the computer, how to use ICT to assess and grade students and how to use software applications like Google Suite and Microsoft Office applications. This result confirms studies that have found teachers' training in ICT-related programs as a key factor to successful integration of ICT into classroom teaching (Buabeng-Andoh, 2019; Lawrence & Tar, 2018). As headteachers support teachers through ICT-related training, it will help develop teachers' competence in computer use (Aydin et al., 2016) and influence their attitudes toward computers (Hu, 2017; Mogwe & Balotlegi, 2020). Such training will further enable teachers to confidently select and handle a variety of diverse computer applications for varied usages and competently use ICT in the classroom (Asad et al., 2021; Kundu & Bej, 2021).

While the result obtained from the teacher participants confirmed that they received support in the form of in-house (school level) and external training in ICT, they however reported that such training programs were not frequently organized. This confirms past literature which suggests that training activities to enhance teachers' knowledge and skill in teaching with ICT in Ghana is not a common practice (Agyei, 2013). However, continuous in-service training is necessary for teachers to update their ICT skills and use digital resources in the teaching learning process.

The headteachers further supported their teachers' ICT integration through monitoring and supervision of ICT use in classrooms. Headteachers in the study observed teachers while teaching, observed their lesson plans, and solicited for feedback from students to monitor teachers' usage of ICT in their lessons. Monitoring and supervision of teaching and learning is seen as an important leadership aspect of identifying flaws within the teaching process to improve instruction and learner performance (Bush et al., 2022). Monitoring and supervising teachers in the school environment serves as a guiding strategy for teachers to work according to the school's predetermined goals (Hallinger et al., 2020)

For effective implementation of the policies on ICT in education, there should be adequate infrastructure and facilities (Murithi & Yoo, 2021). Classrooms should be equipped with learner's devices, teacher's devices, shared display projectors, network connectivity as well as other enabling installations (Lawrence & Tar, 2018; Mingaine, 2013). Findings from this study showed that the headteachers offered support toward ICT integration through the provision of ICT infrastructure. The headteachers (mostly from private schools) reported that infrastructure support was in the form of directly providing equipment such as projectors, computers, interactive boards to teachers; giving teachers loan facilities to buy ICT hardware tools like personal laptops and projectors; providing internet facilities like data; and furnishing ICT labs with computers, projectors and laptops. Headteachers from government schools however provided ICT infrastructure support by providing their personal ICT tools to be used by teachers and hiring or borrowing ICT tools from the community. This result confirms the position that resourceful principals explore many avenues for acquiring technology resources to support ICT integration in their schools (Flanagan & Jacobsen, 2003). Again, the provision of such ICT resources in the schools will indirectly support an increase of media and technology usage in the classrooms (Flanagan & Jacobsen, 2003; Polizzi, 2011). This is in recognition that the adoption and integration of ICT depends mainly on the availability and accessibility of ICT resources (Asad et al., 2021; Boulton, 2017; Lawrence & Tar, 2018).

Headteachers also provided support in the form of maintenance of ICT infrastructure. The headteachers revealed that maintenance services were on both hardware and software equipment and were done internally and externally. Internally, it was done by the ICT-trained teachers or IT experts employed by the school. Headteachers also engaged the services of external ICT experts to help with maintenance of ICT facilities. This resonates with studies that recommend that technology leaders need to ensure that all ICT equipment are serviced regularly in their schools (Flanagan

& Jacobsen, 2003). The result showed that most of the headteachers outsourced technical support since the schools had not employed technicians. The result mirrors studies in other African countries that have found that only few schools employed qualified technicians despite their valuable service for equipment maintenance and sustainability (Kukali et al., 2018; Kundu & Bej, 2021).

Challenges Headteachers Face in Providing Support to Integrate ICT

Despite the support that the headteachers offered to teachers toward ICT integration, they were faced with some challenges. The result showed that financial challenges acted as a key challenge that confronted headteachers in supporting ICT integration in their schools. Participants lamented that they did not have enough funds to support their teachers to purchase laptops for teaching and learning purposes. This result is consistent with studies that found insufficient funding/financial commitment as a major challenge confronting the acquisition and utilization of ICT resources and thus limiting the optimal infusion of ICT in classrooms (Achimugu et al., 2010; Mngadi, 2021) and online learning programs (Adarkwah, 2021).

Headteachers also faced challenges with the provision of ICT-related training for their teachers. This emanated from the high cost of bringing external trainers to train their teachers, teachers expressing lack of time and interest in attending ICT training sessions, and the teachers expressing lack of seriousness to the training programs. The headteachers complained that some of their teachers felt the ICT-related training programs were not necessary because they knew how to use a computer, or felt they were too old to learn how to use a computer. The result aligns with the extant literature that has highlighted teacher and school-level barriers in adopting and integrating ICT in the teaching and learning process to include lack of time, lack of confidence, resistance to change, teachers' attitudes and lack of effective training (Schiller, 2003; Sherry & Gibson, 2002).

Lack of ICT infrastructure is a serious obstacle to the implementation of ICT in schools, especially in developing countries (Mingaine, 2013; OECD, 2015). In this study, the headteachers reported that their schools lacked the required ICT equipment to support ICT integration. Also, they complained about the unavailability of electricity and internet access in their schools. This result is consistent with other studies in Ghana that found lack of electricity/power, poor internet access, lack of computer laboratories, and insufficient number of computers and other digital tools as major hindrances to successful ICT integration in Ghanaian schools (Adarkwah, 2021; Agyei, 2013; Gunu, 2022; Natia & Al-Hassan, 2015). Similarly, it confirms the study result by Langat (2015) who found that infrastructure and ICT equipment shortages were among the challenges facing the implementation of ICT in primary schools in Kenya. It however contradicts that of Bariham et al. (2020) who found that all schools sampled in their study had functioning ICT laboratories and were connected with electricity to facilitate virtual learning. The striking difference could be attributed to the fact that Bariham et al. (2020) study was conducted in only senior high schools while our study was conducted in basic schools that have been found to lack ICT facilities to aid teaching and learning (Agyei, 2013). Nonetheless, effective adoption and integration of ICT into teaching in schools depend mainly on the availability and accessibility of ICT resources (Buabeng-Andoh, 2019).

Lastly, headteachers complained that they could not maintain the ICT equipment. The challenge was due to teachers using ICT tools for their own personal work, inadequate funds, high cost in maintaining equipment, delays on the part of the technicians and difficulty to get some of the parts of the machines to buy. This result is consistent with Mireku et al. (2009) cited in Agyei (2013) that the few computers that the basic schools have easily break down because of lack of air-conditioners and virus infections. Such poor maintenance culture could contribute to frequent breakdown of computers which would exacerbate the problem of availability and accessibility of ICT infrastructure in schools (Natia & Al-Hassan, 2015). Stuart et al. (2009) intimated that maintenance of computers is important if they are to be optimally used.

Conclusion and Recommendation

A number of factors have necessitated an increasing demand for technologically based teaching and learning in the 21st century. Nonetheless, for the use of ICT in teaching to be sustainable, leadership support is important. Educational leaders must show their total commitment to teachers' integration of ICT to bring about the desired transformation. Findings gathered from this study have shown that headteachers in the basic schools of Ghana support ICT integration into teaching and learning in different ways. This included organizing and supporting teachers in ICT-related training programs, monitoring and supervising teachers, providing and mobilizing ICT infrastructure, and maintaining the ICT infrastructure. Though the headteachers provided such supports, they were faced with challenges such as inadequate funds to support the procurement of ICT equipment in schools, lack of stakeholder support in mobilizing ICT resources, rising prices of ICT tools due to inflation, difficulty in training some teachers due to their age, lack of interest shown in participating in ICT training, unavailability of electricity and internet facilities, high maintenance cost, high cost in bringing external trainers to train teachers in ICT, and delays on the part of technicians rendering maintenance services. If teachers' ICT integration is considered low in Ghanaian schools in previous literature, the current study contributes to the debate by shedding lights on the contextual challenges that constrain headteachers in supporting ICT integration in schools. The implication is that for headteachers to successfully support ICT use among their teachers, a conscious effort must be taken to address the challenges they face in providing such support.

We therefore recommend that the Government of Ghana increase the capitation grant it gives to schools and make provisions for a quota to be dedicated toward the provision of ICT infrastructure in schools. We further recommend that the Government of Ghana must provide facilities like computers, projectors, electricity, and internet facilities to government schools as this will help the headteachers support their teachers to properly integrate ICT into teaching and learning. Also, the Ghana Education Service (GES) could create an office in the various municipalities dedicated to the maintenance of ICT tools and resources in the basic schools. That will take away the burden of headteachers facing challenges of repairing broken down tools.

Limitations and Suggestions for Future Research

While the study has shed light on the support headteachers give to teachers in integrating ICT into teaching and the challenges they face, the study results should be interpreted with some limitations in mind. First, the study was carried out in only one educational district and thus the results obtained cannot be generalized to all educational districts in Ghana. Again, it relied on the qualitative research paradigm and thus could not draw on a larger sample to warrant the generalization of results to inform policy. Lastly, the study was limited to only headteachers of basic schools. Nonetheless, the qualitative data obtained are relevant considering that it has brought context into perspective, and also triangulated the interview data obtained from the headteachers with that of the teachers. We therefore recommend future studies to utilize quantitative research designs to draw on larger samples to enable the generalization of the study results to inform policy. Also, future studies could explore the support educational leaders in other levels of education – senior high schools, colleges of education, and universities – offer toward ICT integration and the challenges they face in offering such support. Future studies can explore differences in the support headteachers offer with reference to their demographic and school characteristics.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

ORCID

Usman Kojo Abonyi http://orcid.org/0000-0003-2848-1742

References

Achimugu, P., Oluwagbemi, O., & Oluwaranti, A. (2010). An evaluation of the impact of ICT diffusion in Nigeria's higher educational institutions. *Journal of Information Technology Impact*, *10*(1), 25–34. http://www.jiti.com/v10/jiti.v10n1.025-034.pdf

Adarkwah, M. A. (2021). "I' m not against online teaching, but what about us?": ICT in Ghana post Covid-19. *Education and Information Technologies*, *26*(2), 1665–1685. https://doi.org/10.1007/s10639-020-10331-z

Adarkwah, M. A. (2023). Researching teacher work motivation in Ghana through the lens of COVID-19. *Covid*, *3*(2), 301–319. https://doi.org/10.3390/covid3020023

Afari, E., Eksail, F. A. A., Khine, M. S., & Alaam, S. A. (2023). Computer self-efficacy and ICT integration in education: Structural relationship and mediating effects. *Education and Information Technologies*, *28*(9), 12021–12037. https://doi.org/10.1007/s10639-023-11679-8

Agyei, D. D. (2013). Analysis of technology integration in teacher education in Ghana. *Journal of Global Initiatives: Policy, Pedagogy, Perspective*, *8*(1). http://digitalcommons.kennesaw.edu/jgi/vol8/iss1/5%0AThis

Anderson, R. E., & Dexter, S. (2005). School technology leadership: An empirical investigation of prevalence and effect. *Educational Administration Quarterly*, *41*(1), 49–82. https://doi.org/10.1177/0013161X04269517

Asad, M. M., Hussain, N., Wadho, M., Khand, Z. H., & Churi, P. P. (2021). Integration of e-learning technologies for interactive teaching and learning process: An empirical study on higher education institutes of Pakistan. *Journal of Applied Research in Higher Education*, *13*(3), 649–663. https://doi.org/10.1108/JARHE-04-2020-0103

Asamoah, M. K. (2021). ICT officials' opinion on deploying open source learning management system for teaching and learning in universities in a developing society. *E-Learning & Digital Media*, *18*(1), 18–38. https://doi.org/10.1177/2042753020946280

Asare, S., Amponsah, A., Owusu-Mintah, C., Abrefah-Mensah, E., & Osei Frimpong, K. (2023). Analysis of policy frameworks for integrating ICT in Ghanaian education: Implications for teacher education and professional development: A systematic review. *American Journal of Education and Technology*, *2*(3), 123–128. https://doi.org/10.54536/ajet.v2i3.1888

Asif, M., Edirisingha, P., Ali, R., & Shehzad, S. (2020). Teachers' practices in blended learning environment: Perception of students at secondary education level. *Journal of Education and Education Development*, *7*(2), 286–306. https://doi.org/10.22555/joeed.v7i2.19

Aydin, M. K., Gürol, M., & Vanderlinde, R. (2016). Evaluating ICT integration in Turkish K-12 schools through teachers' views. *Eurasia Journal of Mathematics, Science and Technology Education*, *12*(4), 747–766. https://doi.org/10.12973/eurasia.2016.1227a

Bariham, I., Ondigi, S. R., & Kiio, M. (2020). Preparedness of Ghanaian senior high school instructors for application of online learning in social studies instruction amid the Covid-19 pandemic. *Social Education Research*, 52–64. https://doi.org/10.37256/ser.212021554

Borysiuk, A. (2013). Benefits and disadvantages of the use of information technologies in education. *Edukacja-Technika-Informatyka*, *4*(2), 110–114. https://www.ceeol.com/search/article-detail?id=133797

Boulton, H. (2017). Exploring the effectiveness of new technologies: Improving literacy and engaging learners at risk of social exclusion in the UK. *Teaching and Teacher Education*, *63*, 73–81. https://doi.org/10.1016/j.tate.2016.12.008

Braun, D., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Buabeng-Andoh, C. (2019). Factors that influence teachers' pedagogical use of ICT in secondary schools: A case of Ghana. *Contemporary Educational Technology*, *10*(3), 272–288. https://doi.org/10.30935/cet.590099

Bush, T., Fadare, M., Chirimamboawa, T., Enukorah, E., Musa, D., Nur, H., Nyawo, T., & Shipota, M. (2022). Instructional leadership in sub-Saharan Africa: Policy and practice. *International Journal of Educational Management*, *36*(1), 14–31. https://doi.org/10.1108/IJEM-01-2021-0027

Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. Routledge.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design* (4th ed.). Sage Publication.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–339. https://doi.org/10.2307/249008

Flanagan, L., & Jacobsen, M. (2003). Technology leadership for the twenty-first century principal. *Journal of Educational Administration*, *41*(2), 124–142. https://doi.org/10.1108/09578230310464648

GhanaWeb. (2011). *Ministry of education launches basic school computerisation project*. Retrieved November 9, 2023, from https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Ministry-of-Education-launches-basic-school-computerisation-project-218630

Grabe, M., & Grabe, C. (2007). *Integrating technology for meaningful learning* (5th ed.). Houghton Mifflin.

Gunu, M. (2022). Assessing information and communication technology (ICT) integration into the curriculum of Ghanaian pre-tertiary schools: A case study of Sagnerigu municipality. *The International Journal of Education and Development Using Information and Communication Technology*, *18*(1), 253–263.
Gurr, D. (2000). The impact of information and communication technology on the work of school principals. *Leading & Managing*, *6*(1), 60–73. https://doi.org/10.1109/HICSS.2001.927037
Hallinger, P., Gümüş, S., & Bellibaş, M. Ş. (2020). Are principals instructional leaders yet? A science map of the knowledge base on instructional leadership. *Scientometrics*, *122*(3), 1629–1650. https://doi.org/10.1007/s11192-020-03360-5
Hennessy, S., Harrison, D., & Wamakote, L. (2010). Teacher factors influencing classroom use of ICT in Sub-Saharan Africa. *Itupale Online Journal of African Studies*, *2*, 39–54.
Hu, C. (2017). Students, computers and learning: Where is the connection? *Education and Information Technologies*, *22*(6), 2665–2670. https://doi.org/10.1007/s10639-017-9670-6
Jogezai, N. A., Ismail, S. A. M. M., & Baloch, F. A. (2022). Head teachers' change facilitation styles and teachers' concerns about ICT integration. *Management in Education*, *36*(2), 82–93. https://doi.org/10.1177/0892020620932365
Kleven, T. A. (2007). Validity and validation in qualitative and quantitative research. *Nordisk Pedagogik*, *28*(3), 219–233. https://doi.org/10.18261/ISSN1891-5949-2008-03-05
Korle-Klottey Municipal Assemply. (2020). *Composite budget for 2021–2024 programme based budget: Estimates for 2020*. https://mofep.gov.gh/sites/default/files/composite-budget/2021/GR/Korle_Klottey.pdf
Kukali, A. N., Kawasonga, M., & Rabari, J. (2018). Factors influencing principals leadership for ICT integration in public secondary schools management in Bungoma County, Kenya. *Information and Knowledge Management*, *8*(6), 12–32.
Kundu, A., & Bej, T. (2021). Ingestion and integration of ICTs for pedagogy in Indian private high schools. *E-Learning & Digital Media*, *18*(2), 163–184. https://doi.org/10.1177/2042753020957493
Langat, A. C. (2015). Barriers hindering implementation, innovation, and adoption of ICT in primary schools in Kenya. *International Journal of Innovative Research & Development*, *4*(2), 1–11.
Lawrence, J. E., & Tar, U. A. (2018). Factors that influence teachers' adoption and integration of ICT in teaching/learning process. *Educational Media International*, *55*(1), 79–105. https://doi.org/10.1080/09523987.2018.1439712
Luhamya, A., Bakkabulindi, F. E. K., & Muyinda, P. B. (2017). Integration of ICT in teaching and learning: A review of theories. *Makerere Journal of Higher Education*, *9*(1), 21–36. https://doi.org/10.4314/majohe.v9i1.2
Makhanu, E. S. (2010). *Principals' literacy in ICT: Towards improving secondary school performance in Kenya* [Doctoral thesis, University of South Africa]. http://hdl.handle.net/10500/3837%0A
Mingaine, L. (2013). Leadership challenges in the implementation of ICT in public secondary schools, Kenya. *Journal of Education & Learning*, *2*(1), 32–43. https://doi.org/10.5539/jel.v2n1p32
Ministry of Education. (2003). *Education strategic plan 2003 to 2015: Volume 1 policies, targets and strategies*. Government of Ghana.
Ministry of Education. (2008). *ICT in education policy*.
Ministry of Education. (2015). *ICT in education policy*. https://planipolis.iiep.unesco.org/sites/default/files/ressources/ghana_ict_in_education_policy_august_2015.pdf
Ministry of Education. (2018). *Education strategic plan 2018–2030*. https://www.globalpartnership.org/sites/default/files/2019-05-education-strategic-plan-2018-2030.pdf
Mngadi, S. W. (2021). *Exploring principals' leadership roles in supporting Information Communication Technology (ICT) integration in teaching and learning in secondary schools*. University of Kwazulu-Natal. https://researchspace.ukzn.ac.za/handle/10413/20248
Mogwe, A. W., & Balotlegi, P. (2020). Barriers of information communiction technology (ICT) adoption in Botswanas' primary education. *Journal of Education and Learning (EduLearn)*, *14*(2), 217–226. https://doi.org/10.11591/edulearn.v14i2.15312
Muir-Herzig, R. G. (2004). Technology and its impact in the classroom. *Computers and Education*, *42*(2), 111–131. https://doi.org/10.1016/S0360-1315(03)00067-8
Murithi, J., & Yoo, J. E. (2021). Teachers' use of ICT in implementing the competency - based curriculum in Kenyan public primary schools. *Innovation and Education*, *3*(5), 1–11. https://doi.org/10.1186/s42862-021-00012-0
Mwawasi, F. M. (2014). Technology leadership and ICT use: Strategies for capacity building for ICT integration. *Journal of Learning for Development*, *1*(2), 1–8. https://files.eric.ed.gov/fulltext/EJ1106114.pdf
Natia, J. A., & Al-Hassan, S. (2015). Promoting teaching and learning in Ghanaian basic schools through ICT. *The International Journal of Education and Development Using Information and Communication Technology*, *11*(2), 113–125.
OECD. (2015). *Students, computers and learning: Making the connection*. PISA, OECD Publishing. https://doi.org/10.1787/9789264239555-en
Ottestad, G. (2013). School leadership for ICT and teachers' use of digital tools. *Nordic Journal of Digital Literacy*, *7*(1), 107–125. https://doi.org/10.18261/issn1891-943x-2013-01-02-07
Patton, M. Q. (2002). *Qualitative research and evaluation methods*. Sage.
Pius, S. C., Mutsotso, S., & Edwin, M. (2019). Influence of technical support on ICT integration in classroom practices in public primary schools in Bungoma County, Kenya. *International Journal of Science and Research*, *8*(10), 55–61.

Polizzi, G. (2011). Measuring school principals ' support for ICT integration in Palermo, Italy. *Journal of Media Literacy Education*, *3*(2), 113–122. www.jmle.org

Schiller, J. (2003). Working with ICT: Perceptions of Australian principals. *Journal of Educational Administration*, *41*(2), 171–185. https://doi.org/10.1108/09578230310464675

Sherry, L., & Gibson, D. (2002). The path to teacher leadership in educational technology. *Contemporary Issues in Technology and Teacher Education*, *2*(2), 178–185.

Shin, W. S. (2015). Teachers' use of technology and its influencing factors in Korean elementary schools. *Technology, Pedagogy & Education*, *24*(4), 461–476. https://doi.org/10.1080/1475939X.2014.915229

Smith, J., Flowers, P., & Larkin, M. (2009). *Interpretative phenomenological analysis: Theory, method and research*. Sage.

Stuart, L. H., Mills, A. M., & Remus, U. (2009). School leaders, ICT competence and championing innovations. *Computers and Education*, *53*(3), 733–741. https://doi.org/10.1016/j.compedu.2009.04.013

Thaheem, S. K., Jafre, M., & Abidin, Z. (2022). Online teaching benefits and challenges during pandemic COVID-19: A comparative study of Pakistan and Indonesia. *Asian Education and Development Studies*, *11*(2), 311–323. https://doi.org/10.1108/AEDS-08-2020-0189

Vargas-Montoya, L., Gimenez, G., & Fern, M. (2023). ICT use for learning and students' outcomes: Does the country's development level matter? *Socio-Economic Planning Sciences*, *87*, 1–13. https://doi.org/10.1016/j.seps.2023.101550

Venkatesh, V., & Davis, F. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, *46*(1), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Zuppo, C. M. (2012). Defining ICT in a boundaryless world: The development of a working hierarchy. *International Journal of Managing Information Technology*, *4*(3), 13–22. https://doi.org/10.5121/ijmit.2012.4302