

**EXPLORING HEADMASTERS' TECHNOLOGY LEADERSHIP PRACTICES IN
GHANA**

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ABSTRACT

Technology Leadership (TL) has become the centre of attraction in Educational Leadership, mainly because the 21st century is technology-driven. The purpose of this study was to explore how headmasters' technology leadership could enhance effective teaching and learning of ICT in Ghana using the schools for the blind as a case study. The research sort to explore whether headmasters exhibit TL practices in the discharge of their duties as well as explain the challenges headmasters have been facing and come out with the best way of addressing these challenges. This qualitative case study collected data from two headmasters, four ICT teachers, two heads of departments and two ICT laboratory assistance through interviews and observations. The data was analysed qualitatively using Google Sheet and Draw.io Apps. The results showed that the headmasters exhibited TL practises and this propelled them to be able to implement the teaching and learning of ICT. Also, both the headmasters and their teachers had a good perception of the need for the visually impaired to study ICT to acquire the relevant skills needed for their life-long learning. The study classified the various challenges confronting the teaching and learning of ICT as internal and external depending on who is directly responsible for addressing these challenges so that they could be handled properly. The internal challenges are lack of technology management in decision making, frequent breakdown of computer devices, lack of maintenance of broken devices, teachers not able to teach practical lessons due to inadequate facilities among several others. The external challenges identified are the inadequate supply of computers and assistive devices, ban on the use of mobile phones in schools, lack of internet connectivity and insufficient funding support from the government. It is recommended that the Ministry of Education and the ICT directorate should intensify the contiguous training and in-service of the headmasters to ensure that they develop the needed Technology Leadership skills for effective discharge of their duties.

Key Words: Technology Leadership, Visually Impaired, Assistive Technology Devices, Challenges

1.1 Introduction

The term Technology Leadership (TL) is one of the emerging areas of study in the field of educational leadership in the 21st century which has generated a lot of interest in the research field due to two main reasons (Hamzah, Juraimi, & Mansor, 2016). Firstly, we are in the era of Industrial Revolution (IR) 4.0 which has come with the use of the Internet of Things (IoT) in practically every aspect of human life especially its impact on the teaching and learning process in the classroom (Schwab, 2018). Secondly, in the 21st Century Education (21CE), learning is completely ineffective without the use of ICT (Saavedra & Opfer, 2012). Additionally, TL is aimed at enabling principals to understand how they could help improve teaching and learning of ICT in schools to help learners develop lifelong skills. It has been argued that technology-mediated instruction has overtaken the traditional mode of lesson delivery in the classroom (Ramamurthy, 2017). Therefore, a clearer understanding of TL and its relevance to the 21st century education is very important to school leadership.

Different studies have attempted to define the term Technology Leadership as related to the field of Education. Technology Leadership (TL) is defined as the combination of leadership qualities and the effective utilization of technology resources, equipment, and software to effect a change that is aimed at achieving an organizational goal (Thannimalai & Raman, 2018). On the other hand, Chua, (2017) defined TL as the integration of influence that consists of both the expertise in using ICT and the expertise in leading and managing the educational institution to enhance effective teaching and learning process (Chua & Chua, 2017). Furthermore, Technology Leadership emphasizes and impinges on leaders to develop, manage and apply technological skills in administration and management of institutional operations to improve performance (Håkansson Lindqvist, 2019).

1.1.1 Background of the school for the Blind in Ghana

The schools for the Blind in Ghana were started by the early British Missionaries who started teaching their converts how to read and write in the castles and forts along the coast where they lived. They later established 'Castle Schools' for their children and some of the native children in the communities they settled. One of such schools was that of special education needs which were started as far back as 1936 by the early Christian Missionaries (Mfum-Mensah, 2004). Ten years later, the Basel Missionaries officially started the school for the visually impaired at Akropong in 1946 in the Eastern Region of Ghana whilst the Methodist Missionaries started another school for the blind at Wa in the Upper West region (north-west part) of Ghana. These schools adapted different materials for teaching such as the Braille and the typewriter machines but were made to follow the curriculum of regular education (Mantey, 2017; Mfum-Mensah, 2004).

Presently, there are two main residential Primary and Junior High Schools for the blind and five integrated school (blind and deaf) which cater for the educational needs of visually impaired children. It was not until the 2007 academic year when ICT was introduced into the curriculum of these schools and was made an examinable subject by the West African Examination Council. The schools were provided with ICT laboratories stocked with few computers and some basic accessories each for practical work (Wiafe, 2017). The main aim of this study was therefore to find

out how headmasters TL could help improve the teaching and learning of ICT in the schools for the blind in Ghana. The study is expected to strengthen the headmaster's technology leadership practices that will enhance their efficiency.

1.2 Problem Statement

The technology-driven 21st century has revolutionized the functions of leadership at all levels of educational institutions globally. More attention has been given to how leaders could be prepared technologically to meet the rising demand of this century, with technology leadership becoming one of the most recently researched areas in educational leadership (Chua & Chua, 2017; Lanbon, Cheah, & Siaw, 2020). However, technology leadership is yet to be given the needed attention in the educational system in Ghana, most especially in the schools for children with special needs education such as the schools for the blind (Abraham Lois & Dzakpasu, 2019). Lack of strong technology leadership seems to be the cause of the government's Information Communication Technology for All (ICT4All) initiative not being able to achieve its objectives of supplying ICT devices and accessories to all Primary and Junior High Schools (JHS) in Ghana. As a result, scholars have highlighted that effective teaching and learning of ICT has not been achieved as expected (Agangiba, Nketiah, & Agangiba, 2017; Mantey, 2017). This is evident in the recent calls in the media waves on the low performance of the blind and the visually impaired in the Basic Education Certificate Examination (BECE) results in ICT, coupled with the Chief Examiners of West African Examination Council's (WAEC) reports which alluded that the visually impaired students have not been performing well in their final BECE ICT examinations over the past years (Gyaase, Gyamfi, & Kuranchie, 2019).

With regards to the background headmasters experience in Technology, the general assumption is that most of them are in their fifties and therefore are not well vested in use of modern technologies since they might have completed their education before computers were officially introduced to the school curriculum in Ghana (Abraham Lois & Dzakpasu, 2019; Asiedu-Appiah et al., 2017).

At the bottom line, a search from relevant literature indicates that there is a dearth of study on Technology Leadership and how it can impact ICT for the visually impaired in Ghana (Ampratwum & Offei, 2016; Lanbon et al., 2020). Therefore, there is a need to explore further how the experiences of headmasters' technological leadership could help address the challenges impeding effective teaching and learning of ICT in the schools for the blind in Ghana.

1.3 Purpose of the Study

The purpose of this study to explore the background knowledge and skills of headmasters and their ICT teachers as technology leaders in the school two main residential schools for the blind in Ghana. More importantly, how the headmaster's technology practices have helped in the implementation of the teaching and learning of ICT in these schools in Ghana is of great relevance to the study. Furthermore, since the implementation of ICT teaching and learning comes with its associated challenges, the study intends to identify these challenges and classify them so that they could be addressed easily by the various stakeholders in the implementation process.

1.4 Objectives of the Study

1. Explore Headmasters Technology Leadership (HTL) practices in effective teaching and learning of ICT in Ghana.
2. Identify the Challenges affecting Headmasters as Technology Leaders in the performance of their duties

1.5 Research Questions

1. How can Headmasters Technology Leadership affect the effectiveness of teaching and learning of ICT in Ghana?
2. How do the challenges affecting HTL affect effective teaching and learning of ICT in Ghana?

1.6 Conceptual Framework

The conceptual framework for this study shows how the various challenges affecting headmasters Technology Leadership are classified. These challenges were categorized as external and internal depending on who is directly responsible to address the challenge. Those that emanated from government and policy implementation issues such as conflicting policy objectives, inadequate supply of computer and assistive technology devices and lack of internet connectivity are classified as external challenges.

The external challenges are shown at the extreme ends of this framework which include policy-related changes and Technology related challenges. Few among these challenges includes divergent views from different policy makers on what exactly headmasters wish my results in what Ulvik, Smith, and Helleve (2017) referred to as "professional dilemma".

The internal challenges are school related (Context), headmasters and teachers related (Innovator), the ICT integration challenges (Innovation) and the students related challenges (Operators). These are shown in the diagram in figure 1 below.

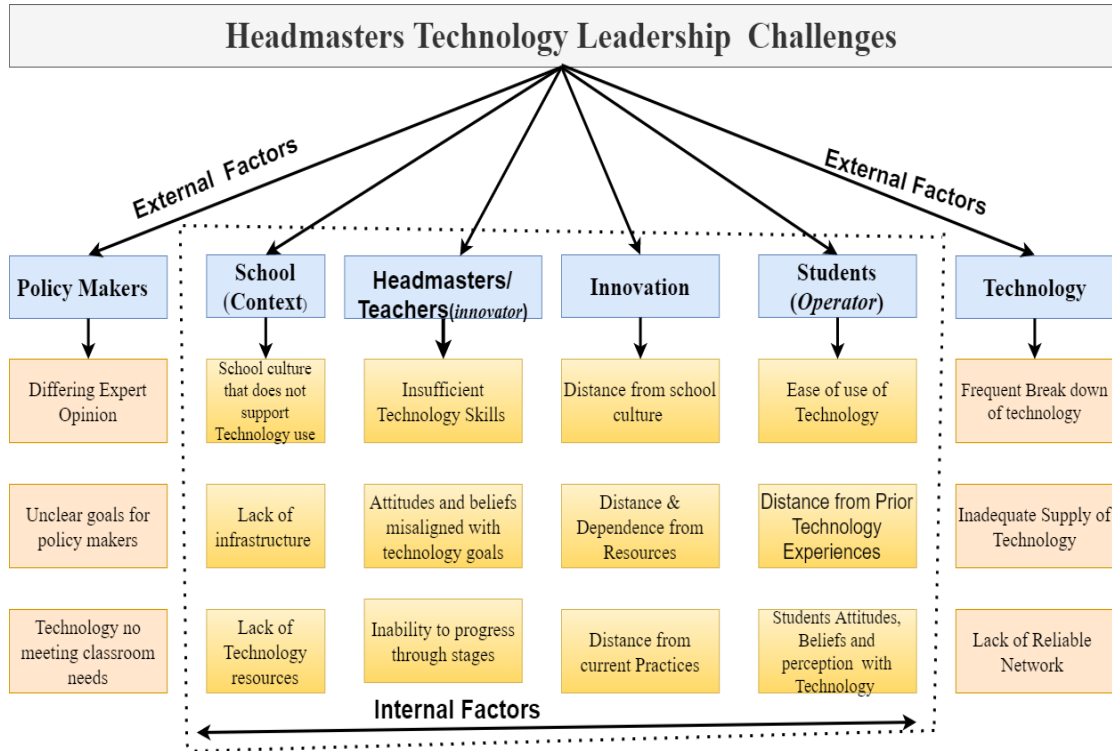


Figure 1: Technology Leadership (Modified from Groff & Mouza, 2008)

2.0 Headmasters Technology Leadership

The term technology leadership is the skills in influencing the performance of an institution by principals with the help of their expertise in using ICT as well as their ability to lead and manage academic issues. Leadership skills in technology consist of two aspects: ICT skills and leadership skills. ICT skills include "deep knowledge" of ICT application and maintenance (functional; technical; product-related; and customer-related); leadership skills represent expertise in organisational development, i.e. leadership and management skills (perception; building and aligning relationships across boundaries; sense making and inventing) (Patrick, 2018). The quality of technology leadership depends on how well technology and leadership skills are integrated (Courville, 2011), (Chua & Chua, 2017).

As highlighted previously in the last chapter, the term Technology Leadership is one of the emerging areas of educational leadership in the 21st century which has generated a lot of interest in the research field due to two main reasons (Hamzah et al., 2016). Firstly, we are in the era of Industrial Revolution (IR) 4.0 which has come with the use of the Internet of Things (IoT) in practically every aspect of human life, especially its impact on the teaching and learning process

in the classroom (Schwab, 2018). Secondly, in the 21st Century Education, learning is not completely effective without the use of Information and Communication Technology (Saavedra & Opfer, 2012). It has been argued that technology-mediated lessons will soon overtake the traditional mode of lesson delivery in the classroom. Different studies have attempted to define the term Technology leadership from different dimensions. According to Chua and Chua (2017, p.73), technology leadership is “the integration of influence that consists of both the expertise in using ICT and the expertise in leading and managing the educational institution” (Chua & Chua, 2017). The universality of 21st-century education demands a robust use of innovative and emerging technologies the classroom. Therefore, Technology Leadership is a key ingredient in managing the teaching learning process to equip present students with pertinent information and skills they will need as future leaders in this fast-changing world (Telukdarie et al., 2018).

A study hypothesized those school leaders who desire transformation in teaching and learning, must not prevent teachers from utilizing technology as an appropriate tool for teaching and learning (Håkansson Lindqvist, 2019). Additionally, the principals’ technology leadership was found to be the most effective way of implementing Technology for teaching and learning, which provides a platform for students to work confidently with technology when completing a task which demands the use of computers (Thannimalai & Raman, 2018).

It has been argued that principals and school leaders must become innovative leaders as they can foster a learning community of the digital age, institutional culture in schools and the advancement of skilled practice (Schoenbart, 2019). Adams (2018) stressed that technology leaders must be a goal-oriented, hands-on and hip-deep in the curriculum and instruction, and acquire skills in three areas, namely “strategy, innovation and leadership” (p. 171). Therefore, an effective school principal does help to boost the performance and the integrity of education (Veeriah, Chua, & Siaw, 2017).

2.1 Technology Leadership Practices

In an attempt to streamline the skills expected from Technology Leadership in education, the International Society for Technology in Education (ISTE), a non-profit making organization responsible for the creation and updating of Technology Standards in education in 2014 established a series of practices for Technology Leaders. These practices are defined as the expertise and knowledge of technology that school managers and leaders need to effectively incorporate into schools (Fuller, 2020). They are Visionary Leadership, Digital age Learning, Excellence in Professional Practice, Institutional Enhancement, and Digital Citizenship. The functions below are what each of these practices are intended to achieve.

Visionary Leadership (VL): Educational Administrators are should be able to empower and lead the creation and implementation of technology integration.

Digital Age Learning (DL): Educational administrators are expected to digitally facilitate learning to enable students to acquire lifelong skills.

Excellence in Professional Practice (EPP): Educational administrators encourage professional development and creativity that empowers students through technology and digital tools to strengthen student learning.

Systemic Improvement (SI): Digital age leadership and management are provided by educational administrators to continually develop the organization through the successful use of innovation.

Digital Citizenship (DC): Educational administrators to model and promote the awareness and responsibilities of social, ethical and legal issues related to emerging digital learning

2.2 Challenges Facing Headmasters Technology Leadership Practices

Studies have shown that the educational sector has been noted as one of the areas which do not often receive much support in the form of funding and ICT materials for teaching and learning especially in Sub-Saharan Africa (Mwakyaja, 2013; Said, 2018). Inadequate support places a lot of challenges on the schools, particularly on the headmasters or the principals.

Concerning the teaching and learning of ICT in the schools for the blind in Ghana, the challenges even seem to be on the steeper slope. The review of the various work of literature has identified several challenges affecting effective teaching and learning of ICT globally and specifically the schools for the blind in Ghana. These challenges are broadly classify under Internal and External challenges (Valenzuela et al., 2018). The differentiation of challenges depends on who is directly responsible for providing the possible solutions to the challenges. For example, challenges that fall within the jurisdiction of policy-makers such as the Ministry of Education, governmental and non-governmental organizations. as well as other international bodies are classified as external challenges. These may include issues related curriculum development, construction of ICT laboratories and supply of teaching and learning materials, staff recruitments, technical support, and funding among others. On the other hand, internal challenges are those challenges affecting daily activities within the school boundaries such as effective teaching and learning, the welfare matters of staff and students, teacher motivation, teachers development etc. are classified under internal challenges because they can be handled locally the by school authorities.

3.0 Methodology

3.1 Research Design

The study used a Qualitative case study approach because it forms the basic framework for outlining the interrelationships between the various research activities required to adequately address the central research question (Creswell, 2017). According to Yin (2017) the choice of a case study should be taken into consideration when: (a) the study aims to address "how" and "why" questions; (b) the actions of those involved in the study cannot be manipulated; (c) you want to cover contextual conditions because you think they are important to the phenomenon under study, or (d) the boundaries between the phenomenon and context are not clear.

3.2 Participants of the study

The two schools for the blind were chosen because they form a unique group of institutions in the educational sector in Ghana. More so, there is a limited number of studies conducted on headmaster's technology leadership and other related issues about the schools for the blind and the visually impaired hence the need to conduct this study in this context. Table 1 shows the background of the participants selected for the study.

Table 1:
Summary of Participants' Background

Anonym	Position	Highest Degree	Years of Service	School	Gender*
H1	Headmistress	Masters	12	A	F
H2	Headmaster	Masters	10	B	M
T1	ICT teacher	Masters	10	A	M
T2	ICT teacher	Bachelors	8	A	M
T3	ICT teacher	Bachelors	8	B	M
T4	ICT teacher	Bachelors	7	B	F
HOD1	Head of Dept.	Bachelors	10	A	M
HOD2	Head of Dept.	Bachelors	9	B	M
Lab A 1	Lab Assistant	HND	7	A	M
Lab A 2	Lab Assistant	HND	5	B	F

** F= Female, M= Male

3.3 Instrument for the Study

The study used an observation checklist, semi-structured interview guide and a field journal to record the personal reflections as a Non-Participant Observer. To collect more detailed data from the respondents, the semi-structured interview guide consisted of open-ended questions based on the research questions and the units of analysis of the research. These interview questions were intended to solicit the views of headmasters, HOD, ICT teachers, and Laboratory Assistant on technology leadership, the effectiveness of ICT teaching and learning, and the challenges in the integration of ICT in the schools for the blind among others.

3.4 Data Collection

The paper used a Semi-Structured Interview guide to collect the data from the respondents because qualitative research always attempts to find answers to the 'why' and 'how' questions. Van Teijlingen (2014) postulated that Semi-structured interview guide is an oral discourse between the interviewer and the interviewee where the former (interviewer) tries to gather useful information from a person (interviewee) through questions. This form of interview is flexible and conversational, allowing the researcher the opportunity to explore and prop further on vital issues. Other researchers supported the use of the semi-structured interview due to its flexibility. However, Castillo-Montoya (2016) is of a counter opinion that semi-structured interview is expensive and takes a lot of time if the research sample is large.

The researcher also augmented the data collection process by using a field journal to record the observations as a Non-Participant Observer. This is to get detailed information on how teaching and learning of ICT is done in each of the selected school for the blind visited. The process also gave the researcher opportunity to have a fair idea of the various assistive technology devices available in each of these schools. Non-Participant Observation is a process whereby a researcher observes how a particular activity is carried out without interfering in the exercise (Sedgwick & Greenwood, 2015). The Non-Participant Observation (NPO) offered the researcher the opportunity for the first-hand experience of how ICT lessons are conducted by the teachers in the classrooms and the ICT laboratory. This observation helped the researcher appreciate some of the challenge's teachers and the visually impaired learners go through during teaching and learning sessions.

3.5 Data Analysis

The data collected from the respondents were analysed with Google Spreadsheets using the five steps inductive approach as opined by Thomas (2006). Using inductive analysis begins with the preparation of raw data files (data cleaning). Audio-recorded interviews were transcribed and formatted to make it more meaningful. Once the text has been prepared, the raw was studied in detail to become familiar with its content and gains an understanding of the themes and events covered in the text.

The next step was the creation of categories or open coding. The researcher identified and defined categories or themes. The upper-level or more general categories was obtained from the objectives of the research. The lower-level or specific categories was derived from detailed readings of the

raw data, sometimes referred to as in vivo coding. This was followed by inductive coding or Axial Coding, where categories were created from actual phrases or meanings in specific text segments. To enhance the coding process, the researcher used qualitative analysis Google Sheet and draw.io tools.

The final stage was continuously revised with the refinement of the category system also referred to as selective coding. The process continued to the point of saturation where no new ideas are emerging from the data. At the saturation point, Silverman (2015) agrees with Burnard (1991) that one stops the collation process because findings will produce the same results. The interpretation arising from the analysis were discussed and related to current findings from the literature. The themes and issues raised were presented as the results of the study.

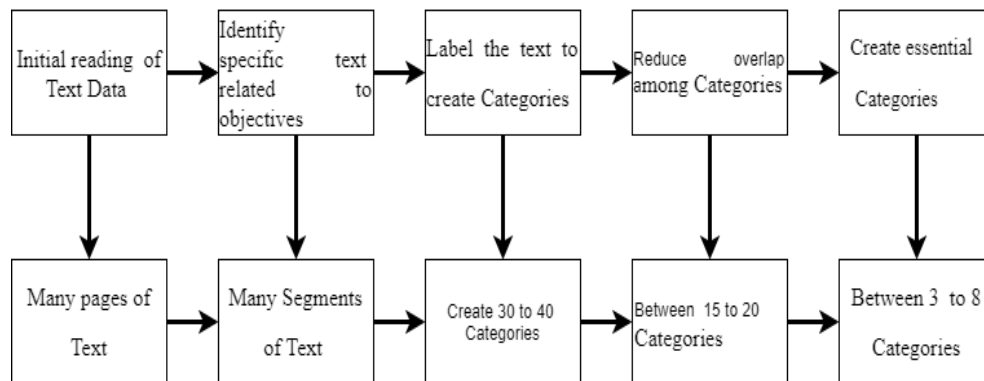


Figure 2: Inductive Data Coding Procedure (Adapted by Watt, 2017)

3.6 Reliability and Validity

To boost the triangulation process of this study, Inter-Coder Reliability (ICR) tests were used to test agreement between multiple coders (Olson, McAllister, Grinnell, Gehrke Walters, & Appunn, 2016). The k-value is defined as the percentage of chance-anticipated disagreements that do not occur or, the percentage of the agreement after chance is eliminated (Cohen, 1960; Landis & Koch, 2016). The ICR test for this study was generated from fifteen codes by three coders or reviewers. The results showed a substantial k-value. A high level of ICR indicates that the coding is both accurate and replicable, thus confirming the proof that the findings of a qualitative sample are scientifically valid (Kurasaki, 2000; MacPhail, Khoza, Abler, & Ranganathan, 2016). Fast forward to the findings resulting from intercoder reliability test, the following presents the Agreement and Disagreement table for Kapa Intercoder Analysis between three reviewers; R1, R2 and R3 analysed in the table 2 below.

Table 2:
Metric from the Reviewers 1 and 2

	R1	Agree	Disagree
R2	YES	7	3
	NO	3	2

Using the following formula, the coefficient is calculated:

$$k = \frac{P_o - P_c}{1 - P_c} \text{ ----(1)}$$

Where P_o = the proportion of units for which the judges agreed (relative observed agreement among raters), P_c = the proportion of units for which agreement is expected by chance (chance expected agreement). From the reviewers R1 and R2; $P_o = 0.80$ and $P_c = 0.37$

$$k = \frac{0.80 - 0.37}{1 - 0.37} \text{ -----(2)}$$

Therefore, $k = 0.68$ ----- (3)

Therefore, the average k-value of 0.68 is rated as a substantial value representing **68%** agreement among the reviewers (MacPhail et al., 2016).

4.0 Findings

Research Question 1: How can Headmasters Technology Leadership affect the effectiveness of teaching and learning of ICT in Ghana?

The findings for the first research question which is on Headmasters Technology Leadership was analysed, it came out that from the responses that many headmasters in Ghana are inclined to with technology leadership and its relevance. They were more concerned with building ICT laboratories that are well equipped with modern facilities to enhance effective teaching and learning of ICT for a better examination result. The summary of findings of the subthemes under RQ1 is presented in Table 3 below with it is a cross-tabulation.

Table 3

Headmasters' Technological Leadership Practices

Sub-themes	Definition of the sub-theme	Codes under sub-theme	Density Count
Headmasters' Technology Leadership practices	This sub theme explains the technological leadership practices that headmasters adopted for their schools.	• Build up-to-date ICT Lab for Teachers and Students	(2)
		• Make students acquire needed ICT skills for lifelong living	(4)
		• Promote Digital Age Learning	(5)
Headmasters as Visionary Leaders	This sub-theme explains headmasters displayed visionary leadership	• Headmasters showed somewhat visionary leadership	(3)
		• Headmasters showed visionary leadership	(6)
		• Headmasters did not show visionary leadership	(1)
Headmasters displayed Excellence in Professional Practice	This sub-theme explains whether headmasters displayed Excellence in Professional Practice	• Headmasters displayed Excellence in Professional Practice	(6)
		• Headmasters professional practice is questionable	(2)
		• Headmasters show little professional practice is questionable	(2)

The Headmistress of School A expressed her view on her practices. She added:

" Am more concern about promoting digital age learning for both teacher and the students and to make sure that they get the needed ICT devices to learn. This will help them acquire the life-long learning skills demanded in this 21st century. Next to this is to ensure that the students pass their exams with better grades ...my ICT teachers and students must get a good ICT lab to make teaching and learning active..."

Respondent H1, Cell C6

Headmaster H2 added:

"One of the things people want to see in the schools is whether you have the right ICT devices for teaching and learning of ICT to enable the learners to acquire the needed skills, and that is my priority for my school. Yes..."

Respondent H2, Cell G6

The ICT teachers believed that what informs headmasters practices for technology development in their schools was the nature of the ICT curriculum. According to Teacher T1,

"I see my headmistress encouraging the students to take their ICT lessons very seriously to enable them learn practical skills... because the syllabus is biased towards practical skill development. That is the problem... almost all the topics as well as their final exams are theory-based"

Respondent T1, Cell D6

Therefore, the first technology leadership practice on digital-age learning is still at developing infrastructure and equipping the ICT labs with the needed devices. The headmasters do this to ensure that their students pass the final ICT qualifying examination with good results. Promoting digital learning with technology override skills development for lifelong living. This is because the ICT curriculum in Ghana is exam-based which invariably affect the headmaster's technology leadership practices.

Headmaster H2 also expressed a similar opinion on his familiarity with technology and displayed professional practices with technology and added that he was privileged to have some level of education in technology while he was a teacher. He added:

"My IT knowledge is dated back to my university education era where I developed an interest in IT and started learning on my own. As someone keen on learning new skills, I have been learning from everyone and everywhere... I believe this has given me a lot of experiences so far technology related issues are concern..." However, I wouldn't rate myself as being very good in IT; maybe just good- as an administrator, I encourage professional development and creativity to empower students through technology and digital tools to strengthen student learning"

Respondent H2, Cell G8

T1 further explained that:

"My headmistress has improved drastically in her experiences with ICT. I'm aware she had no IT background initially; she used to seek my help whenever she encounters any challenge using her PC, but now she is aspect.... I'm happy the way she has become so good, hahahaa..."

Respondent T1, Cell D7

For further explanation, data shows that one of the hallmarks of technology leadership is the ability to initiate and to be innovative in seeking for the ICT devices needed to help the development of an institution. Every technology leader must be a visionary leader who has the skills of taking initiatives and carries his teachers along in advancing technology implementation. It is evident from the above analysis that headmasters of the schools for the blind in Ghana have a good sense of technology initiatives.

The conclusion from the first objective indicates that Technology Leadership is a novel form of leadership in Ghana even though the headmasters interviewed showed a high level of technology leadership skills. Table 4 shows the challenges that headmasters faced in the implementation of ICT teaching and learning.

Table 4:

Challenges that Headmasters faced in the implementation of ICT teaching and learning

Sub-Themes	Within Subthemes	Definition of Sub-theme	Codes under Sub-theme	Density
Challenges in External environmental boundaries of the school.	External challenges facing the headmasters and ICT teachers.	This sub-theme explains the challenges headmasters and teachers faced in ICT teaching and learning which is beyond the boundaries of the school.	<ul style="list-style-type: none"> Failure of government to provided internet facilities 	(2)
			<ul style="list-style-type: none"> Inadequate financial support from MOE to maintain ICT Lab 	(3)
			<ul style="list-style-type: none"> MOE policy on prohibition of mobile devices in schools 	(2)
			<ul style="list-style-type: none"> Inadequate Assistive Technology (AT) devices 	(3)
Challenges in internal environmental boundaries of the school.	Internal challenges in technological management for ICT teachers	Technological challenges which are within the environmental boundaries of the leadership of schools	<ul style="list-style-type: none"> Teachers lack required skills on modern Assistive Technology (AT) devices 	(2)
			<ul style="list-style-type: none"> Frequent breaking down of ICT devices by the students 	(2)
			<ul style="list-style-type: none"> Lack regular in-service training for teachers. 	(4)
	Consequences of internal challenges to Teaching and learning	This sub-theme explains the internal challenges of teaching and learning of ICT	<ul style="list-style-type: none"> Teachers are not able to teach practical skills 	(2)
			<ul style="list-style-type: none"> Schools are not able to get good results in their ICT exams 	(3)
			<ul style="list-style-type: none"> Students are not able to acquire the requisite ICT skills needed for life 	(5)

Research Question 2: How do the challenges affecting HTL affect effective teaching and learning of ICT in Ghana?

The findings from the second research question show that the headmasters face diverse challenges which affect the teaching and learning of ICT in the schools for the blind and the visually. These challenges can be classified into two; external and internal challenges. This is because some of these challenges emanate from sources outside the confines of the school and therefore is classified as an external challenge. However, there are others which are from within the confines of the school and are therefore classified as an internal challenge. The analysis of the external challenges indicates that inadequate financial support from MOE to maintain ICT Laboratory and MOE policy on prohibition of mobile devices in schools are the two main issues affecting the teaching and learning of ICT in the school for the blind in Ghana.

The responses to the questions on internal challenges affecting the schools for the blind show that the majority of the respondents attested that frequent breaking down of the computers and assistive technology devices by the students was one of their main challenges. These challenges as stated above do not affect only the students but the teachers as well. The first subtheme within the internal challenges shows that there is inadequate computers and Assistive Technology devices and the frequent breakdown of these devices have rendered teachers incapable of teaching ICT practically which has resulted in learners not able to acquire the needed basic practical skills such as word processing

Headmaster H2 also mentioned the lack of ICT lab as a challenge but was more emphatic on the lack of assistive technology and other computer devices. He added:

"I am more concerned about how we can make ICT teaching and learning effective, but this cannot be done without internet connectivity.... the use of the appropriate assistive technology devices and the recommended software applications for learning.... unfortunately, these devices and software are woefully inadequate...government supply has not been reliable at all. It takes a long time to receive material support from the powers that be...."

Respondent H2, Cell G15

Another pressing issue that was mentioned is the government ban on the use of mobile devices in Ghana. Lab Assistant A 1 further expounded his point:

"I think the government ban on the use of mobile devices in schools is impeding the effective teaching and learning of ICT in this school. Learners do not have access to ICT devices after the normal classroom work which is not the best...."

Respondent ST2, Cell K15

5.0 Discussion

Research Question 1: How can the Headmasters' Technology Leadership Practices help in the implementation of the teaching and learning of ICT in the selected schools for the blind in Ghana?

To answer this question, qualitative descriptive data from interviews and observations were used with the main focus on the exact quotations from the transcripts of the respondents. The findings indicated that the headmasters and teachers in the schools for the blind in Ghana had sound knowledge and experience in the use of technology. This influences their practices of using technology in the schools for the blind. The information from the biodata of headmasters shows that they completed their bachelors' degree program in education before technology become part of the curriculum for teachers. As such one would have expected these headmasters to be digital natives with little or no knowledge about computers. Indeed, they admitted that they never had the opportunity of studying technology however, their knowledge and experience in ICT is as a result of the continuous training and personal development. They therefore exhibited qualities such as visionary leadership, digital learning and professional practice s technology leaders. The continuous training coupled with positive mind set in technology play a key role in enhancing the effective teaching of ICT in the schools for the blind in Ghana. This finding is in line with Lanbon et al. (2020) concluded in their research that the continuous training of headmasters in the schools for the blind in Ghana influences the use of technology in their schools.

Relating to how technology leadership can enhance effective teaching and learning of ICT, research has shown that Technology Leaders have the propensity to integrate and supply technology devices for teaching and learning to bring transformation in an organization for improvement in performance as well as output (Al-Hariri & Al-Hattami, 2017). Furthermore, Gurley, Anast-May, O'Neal, and Dozier (2016) also posited that effective technology integration and implementation must have the sole objective of improving students' achievement in technology. The above findings are consistent with Adams (2018) that the more technology is applied to teaching and the management of a school process, the better the quality of the school performance in ICT. What is more, Courville (2011) found that technology leaders are strong advocates for further use of technology and have a major impact on functions, procedures and uses of technology. Furthermore, technology leadership requires a great deal of proficiency in technology integration and implementation into the classroom (Lanbon et al., 2020).

Therefore, the findings related to the first research question indicated that Technology Leadership plays an important role in the effective ICT implementation of teaching and learning of ICT because the headmasters have good working skills and experiences as technology leaders. However, the concept of 'Technology Leadership' is still a new one in Ghana, and therefore there is a dearth of study in this area.

Research Question 2: How do the challenges affecting HTL affect effective teaching and learning of ICT in Ghana?

Findings related to the second research question showed that the internal challenges are caused by external challenges. The main internal challenges identified frequent breakdown of devices and inadequate ICT and AT devices. The headmasters devoted their attention to internal challenges because they were within their means. Again, the Headmasters felt that dealing with internal challenges was both practical and manageable. The headmasters however lamented that the challenges could not be solved completely since they were not able to tackle the root causes of the challenges. The above findings are in line with Kauffman, Anastasiou, Badar, Travers, and Wiley (2016) who reported that the supply of educational materials and facilities to schools in Ghana is skewed against the schools for the Blind in Ghana. Furthermore, Vishwakarma, Sharma, and Vishwadiyalaya (2015) found out that lack of AT devices in schools for the Blind had a direct impact on students' performance and the knowledge of ICT use. Inadequate supply of ICT devices leads to the feeling of discrimination and the lack of interest in AT use. This challenge has compelled some ICT teachers to think that teaching ICT to the blind and the visually impaired is not a priority of the Government (Opoku, 2016).

In similar studies conducted in Tanzania, 58% of the respondents admitted that the main challenge facing the schools for the blind was inadequate ICT facilities. The study therefore, concluded that ICT facilities played a key role in enhancing effective teaching and learning of ICT (Eligi & Mwantimwa, 2017). Research by Ampratwum and Offei (2016) reported that 95% of some selected final year students in the schools for Blind in Ghana complained of weakness in keyboard skills and JAWS application because most of these devices were not functioning effectively. This was confirmed by Jadhav, Chambers, and Tatpuje (2020) who observed in a study that teachers' main challenge with ICT teaching and learning was the inadequate Assistive Technology (AT) devices. The second research objective on the challenges affecting effective teaching and learning of ICT was also achieved in this study.

5.1 Implications of The Study

The main objective of this study was to investigate how headmasters' technology leadership could help propel the teaching and learning of ICT in the school for the blind in Ghana. The findings from the study and supported by literature have two main implications for advancing the body of knowledge in 21st century education. In the first place, technology leaders play an important role in the implementation of teaching and the learning of ICT however, the exact practices expected to be demonstrated by the technology leaderships are not specified for the headmasters to follow. This study will therefore add to the existing body of knowledge on technology leadership practices. Again, the study could be useful to teachers and educators as well as IT trainers in general about how these TL practices could enhance the learning of ICT.

The information provided could help bridge the digital gap between the willingness of headmasters to implement ICT teaching and learning and the skills required to make the implementation process

reality as a requirement of 21st-century education. Since the literature on Technology Leadership is quite limited in the context of Ghana, the paper will form the basis for further studies on other aspects of Technology leadership. The findings will help policymakers, stakeholders, and practitioners to search for effective ways of solving the challenges impeding the smooth implementation of ICT education the schools for the blind and beyond.

5.2 Suggestions for Future Studies

The present study exemplifies the need for identifying more programs that may help to develop more technology leaders who will also promote technology education at all levels of schools in Ghana. There is, therefore, the need for further studies to analyse why there are disparities between what found in the ICT curriculum and what is implemented and how these differences can be ironed out to bring about uniformity and coherence in ICT teaching and learning in the schools for the blind. There is a need to examine and compare the impact of technology leadership with transformational leadership in enhancing the teaching and learning of ICT in the Senior Secondary Schools (SSS) in Ghana.

5.3 Conclusion

This study aimed to analyses how technology leadership could enhance effective teaching and learning of ICT in the schools for the blind and the visually impaired in Ghana. To achieve this purpose, a qualitative research methodology was adopted, and data was collected using interviews and observation. The data was collected from headmasters, ICT teachers and other key staff members were analyzed using Google Sheet and draw.io apps. The findings indicated that Headmasters as Technology Leaders play a key role in shaping ICT education in the schools for the blind in Ghana. The results also clarified that the main challenges facing the schools for the blind are both internal and external. The internal challenges are lack of technology management in decision making, frequent breakdown of computer devices, lack of maintenance of broken devices, teachers not able to teach practical lessons due to inadequate facilities among several others. The eternal challenges identified are the inadequate supply of computers and assistive devices, ban on the use of mobile phones in schools, lack of internet connectivity and insufficient funding support from the government.

In short, technology leadership is still a new spectrum in educational leadership especially ICT education in Ghana and every human and materials resources need to be harnessed to help prepare more technology leaders to improve upon the standard of ICT education in Ghana. Finally, the findings will contribute to the body of knowledge in Technology Leadership and ICT education in Ghana.

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