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Original Article

Limitations of ICT Infrastructures in the Implementation of ICT Policy in Public Secondary Schools in Urambo District Council, Tanzania

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*ICT Infrastructures,
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This study sought to analyse ICT infrastructure limitations in the implementation of ICT policy in public secondary schools in the Urambo District Council in the Tabora region in Tanzania. The study employed a qualitative research approach with a case study design and a sample of 40 research respondents selected through purposive and simple random sampling. Questionnaires and interview guides were used to collect data. The data were analysed through thematic analysis and descriptive statistics. Resource-based theory, developed by Jay Barney in 1991, underpinned the study. Infrastructure limitations hindering the implementation of ICT policy are a lack of computer laboratories, biogas and wind power, among others. The study recommends that policymakers and the government are to ensure the availability of materials and resources. Also, school administrators are to manage and ensure the availability of resources for the satisfactory implementation of the ICT policy. Finally, further researchers could investigate the level of implementation of ICT policy in private secondary schools.

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INTRODUCTION

A school administrator is an educational leader responsible for managing the daily operations and overall functioning of a school. School administrators include positions such as head of school, second head of the school, academic administrator of the school, and school discipline administrator of the school (Karakose et al., 2021). Information Communication Technology Policy is a set of guidelines, regulations, and strategies designed to manage the use of technology and communication systems within an organisation, government, or educational institution (Singh, 2021). There is a strong relationship between school administrators and the implementation of ICT policy because they are responsible for providing instructional leadership, managing budgets, and ensuring a safe and productive learning environment in developing and implementing ICT policies in secondary schools (Shaturaev, 2021).

In Japan, Information and Communications Technology in Education enhances conventional teaching methods, creates new learning possibilities, and lessens opposition to the introduction of disruptive technologies like cell phones. ICT's educational affordances create numerous opportunities to complement and integrate with the current new ICT policy that can help administrators, together with policy makers, to implement it in a successful way (Ilic, 2021).

In the Philippines, school administrators are facing obstacles in the training of ICT in schools, including scarcity of ICT resources in third-district schools, undersupply of ICT resources, shortage of qualified teachers with ICT skills, lack of experts for maintenance, as well as poor internet connectivity. Scholars have advised the government to take procedures for the purpose of ensuring students are trained in a safe environment to gain quality

knowledge for their future. For example, training of teachers and allocation of funds in schools for ICT maintenance and practices (Tamayo, 2024).

In South Africa, there is a relationship between the quality of teachers and the quality of education training of teachers in ICT mentorship programs, professional development opportunities like seminars, as well as a training and certification plan (Ajani et al., 2023). These are among the strategies which influence classroom instructional delivery strategies, teaching and learning methodologies are observed to improve learning content outcomes among students

In Nigeria, there are several challenges facing administrators in implementation of ICT in public primary schools such as inadequate of funding of ICT programs, inadequate ICT infrastructural facilities, shortage of manpower, unstable power supply, high cost of ICT equipment's and poor implementation of policies in schools, to solve these drawbacks some strategies such as funding computer education programs, providing ICT facilities, lowering the cost of ICT facilities, implementing ICT policies for education, building teacher capacity, and providing consistent internet and electricity services in order to avoid the difficulties facing the administration of ICT infrastructure are used to combat the challenges (Jedege et al., 2019). These challenges are seen to be similar in various countries, which should not be different case in Tanzania.

In Zambia, different schools are using ICT in education courses in different ways; there is a dearth of ICT infrastructure in peri-urban schools. For instance, business and non-governmental organisations donate computers to urban schools. The study also shows that a lack of competent teachers, a lack of finances, and a shortage of energy in some peri-urban areas are some of the obstacles

to the successful integration of ICTs in education. The survey indicates that although there has been consistent advancement in the use of ICTs in classrooms, much more work needs to be done if the nation is to reach a 100% acceptance rate for ICT subjects. According to the report, the government should arrange and support workshops and conferences for present instructors to receive training, as well as formally request gifts of computers and related equipment from businesses and non-governmental organisations. (Nyanja, 2019)

In Kenya, the government has invested several strategies for the aim of making improvements in the training of ICT in secondary schools, such as the provision of ICT infrastructures, internet connectivity and digital content. Despite these efforts by the Ministry of Education, ICT facilities are not enough compared to the number of students, which limits the students to learn practically, and internet connectivity, especially in schools located in rural areas. Also, capacity building for teachers is still a challenge, limiting the training of ICT to students, especially in new emerging technologies. Another overhead cost in repair, internet and maintenance tends to be a setback in integrating ICT in education (MoE, 2021).

In Tanzania, the government has introduced various policy papers and initiatives to promote the effective use of ICT in education. In 1996, the government introduced the National Science and Technology Policy, which aimed at guiding the use of science and technology for the country's economic, social and political development (MICT, 1996). The National ICT Policy of 2003 aimed to harness ICT as a tool for national development by promoting its use in both public and private sectors (MICT, 2003). ICT Policy for Basic Education, which focused on integrating ICT into pre-primary, primary, secondary and vocational education to enhance access, improve quality and equity in education (MICT, 2007). Another National ICT policy of 2016 emphasised the transformation of

Tanzania into a knowledge-based society through the use of ICT (MICT, 2016). To enhance learning, the policies suggest the use of a number of technologies, such as radio, television, computers, mobile phones and the Internet. Finally, drafted national ICT policy of 2023, which aimed at transforming Tanzania into a digital-enabled knowledge-based economy through effective, innovative and sustainable development and utilisation of digital systems, solutions and services for national development (MICT, 2023). Education and training policy of 2014, 2023 (Ed) insisted on the use of ICT in delivering teaching and learning materials at all levels of education within the formal and outside formal education system (MoEST, 2023). In response to that, schools are obliged to introduce teaching of the ICT subject to enable students to acquire with necessary skills which are applicable in real-life situations. Computer science is a compulsory subject for students who choose to join the ICT stream and it is optional for students who wish to develop a foundation in computer science and its related careers for the aim of developing students with 21st-century skills, which include creativity, communication, collaboration, critical thinking and problem-solving skills (TIE, 2023).

Despite the strategies of the government to insist on the integration of ICT in secondary schools. Recently, scholars have revealed that the integration of ICT in secondary schools is poor (Ndume et al., 2021). Also, teachers do not use ICT tools in teaching and learning in most secondary schools (Joseph, 2021). This made a researcher investigate the challenges facing school administrators in the implementation of ICT policy in public secondary schools.

If ICT is taught effectively, human resources with the necessary skills will be produced for national development and fostering innovation and problem-solving skills among students and teachers for building a competitive economy in the globalised world (MoEST, 2023).

While literatures currently offer insightful information about the difficulties in implementing ICT policies both globally and here in Tanzania, there is still a gap on the difficulties faced by school administrators in rural Tanzanian such as Urambo District. Rural implementation dynamics have received relatively little attention in previous research because it has mostly concentrated on urban and semi-urban environments.

LITERATURE REVIEW

Theoretical Review

Resource-Based View Theory

The resource-based view theory was developed by Jay Barney (1991), who published an article titled “Firm Resources and Sustained Competitive Advantage” in 1991. The Resource-Based View is a managerial framework that emphasises the importance of a firm’s internal resources as the primary source of competitive advantage. The theory posits that firms are heterogeneous in nature due to their unique resource endowments, which allows them to pursue different strategies and achieve varying levels of success in competitive markets (Freeman et al., 2021). Resource-based view theory is related to this study because it emphasises the use of internal resources of an organisation or institution. Similarly, in the training of ICT, the government should ensure schools are equipped with resources which will influence teaching and learning of ICT in public secondary schools. Also, the theory emphasises the uniqueness of resources which are produced by the organisation for competitive advantage. In comparison with this study, educational organisations should impart ICT skills which are unique from other organisations, and those skills should be beneficial to enable them to compete in the world market for employment. Moreover, the theory places much emphasis on the use of internal resources rather than external resources. When it is utilised in a school environment, school administrators can reduce debt crises which occur as a result of depending on

external resources which have high interest rates, leading to debt.

Empirical Review

ICT Infrastructure Limitations for Implementation of ICT Policy

Kumar (2023) conducted a study on problems faced by schools in the implementation of ICT in India. The study employed a qualitative research approach with descriptive design. Data were collected through questionnaires, interviews and documentary reviews. The findings revealed that in rural areas, schools have no electricity and other resources such as computers, printers, multimedia projectors, scanners and smartboards, which are not available as most schools have one computer and one printer. The study recommends increasing infrastructure in schools for the successful implementation of ICT in schools. On the other hand, the researcher did not indicate the population and sample size, which makes it difficult to know whether the population was adequate to provide data or not. To cover this gap, the researcher indicated the number of respondents who were used to provide data.

Nduwayezu et al. (2022) conducted a study on challenges preventing the successful use of ICT for teaching and learning biology in Rwandan secondary schools. The study employed a descriptive survey research design by collecting both qualitative and quantitative data from 64 Biology teachers as research participants who were randomly selected from secondary schools. Data collection tools were questionnaires and interviews. The findings showed that challenges preventing the adequate use of ICT for teaching Biology were the lack of adequate ICT resources, such as internet connectivity and computer accessibility. The study recommends that all educational stakeholders increase their investment by providing adequate ICT resources in schools. On the contrary, the researchers had investigated the limitations related to ICT resources, only living a gap to sources of

power-related challenges which can affect the implementation of ICT in schools. To cover such a gap, the researcher investigated the sources of power which affect the implementation of ICT policy.

Joseph (2021) studied the use and challenges of ICT in Secondary Schools in Tanzania. The study adopted a cross-sectional and descriptive survey with a sample of 120 secondary school teachers. Data were collected mainly through questionnaires and interviews for additional data. The findings revealed that Unreliable internet connectivity, lack of standby power and inadequate infrastructures, particularly PowerPoint, projectors, software, computers, scanners and printers, affect the integration of ICT in secondary schools. The finding implies that a lack of ICT infrastructure is the main obstacle to the implementation and use of ICT facilities in the secondary schools in the study area. To contrast, researchers had collected data from teachers only, leaving a gap to school administrators and students who can provide data on the challenges which they encounter in using ICT in secondary school. To cover the gap, the researcher collected data from school administrators and students.

Okello et al. (2020) conducted an investigation to assess the availability of ICT infrastructures and adequacy of ICT technical personnel for the implementation of a digital literacy programme in public primary schools in Kenya. The study employed a descriptive survey design with a sample size of 5 head teachers, 35 regular teachers and 10 pupils who were selected using purposive sampling. Questionnaires and observation checklists were used for data collection. The data were analysed through descriptive and inferential statistics with the help of SPSS version 22.0. The findings showed the infrastructures which are supposed to be in schools for effective training of ICT in schools, including internet connectivity, computer rooms, digitalised materials and digital devices. The study highlights the government to pay attention to supplying ICT tools for the implementation of ICT

effectively because the infrastructure was not adequate. On the other hand, the researcher employed a sampling technique which do not correlate with the research approach because the study was quantitative in nature and the sampling technique was purposive sampling, which is qualitative in nature.

Wanjiku (2022) studied on availability and use of information and communication technology in the teaching and learning of English in secondary schools in Nakuru County, Kenya. The study adopted a mixed-method approach and descriptive survey research design with a sample size of 34 principals, 68 English teachers and 680 students. Data were collected through questionnaires, interview guides and observation schedules. Data were analysed using descriptive statistics with the aid of SPSS. The findings showed that the ICT infrastructures which are used in teaching and learning English include computer, television, printer, CD-ROM, cell phones, radio, laptop, IT room, projector and interactive white boards. The researcher reported that those facilities were not enough when compared to the number of students. Also, the researcher had succeeded in showing the skills which students gain as a result of using ICT in teaching and learning in the English language, including writing, reading, speaking and listening skills.

Fidelis and Onyango (2021) studied on availability of ICT facilities and teachers' competence in the use of ICT among public Secondary schools in Ngara district, Tanzania. The study employed a mixed-method approach and data were collected through interviews and questionnaires. Purposive sampling and simple random sampling were used to get a sample of 84 from the population of 525. Thematic analysis and descriptive analysis were used to analyse data. The findings showed the ICT facilities such as computers, photocopy machines, modems, computer laboratories and internet connectivity. The study insisted that the government provide funds in schools, which could be used for buying

ICT infrastructures in schools. The researcher had to show the role of school administrators in managing the ICT facilities found in the school environment, as well as their efforts towards increasing ICT devices in schools.

METHODS

Research Approach

The study used qualitative research approach. Under qualitative research approach people make sense out of their own concrete, real-life experiences in their own minds and in their own words. Moreover, qualitative research approach helps in understanding the investigated phenomenon in deep due to its methods of collecting data which conceptualise a phenomenon from different dimensions (Cresswell & Cresswell, 2023).

Research Design

This study used a case study design. Case study design is used when the aim of the researcher is to develop an in-depth analysis of the phenomenon being studied. The researcher can collect data related to a phenomenon by using multiple methods, including interviews and questionnaires for seeking detailed information (Cresswell & Cresswell, 2023). The researcher collected a variety of information related to ICT training in Public secondary schools in detail so as to gain new insights on the level of implementation of ICT policy.

Area of Study

This study was conducted at Urambo District Council in Tabora region. The researcher selected this area because of the existing difference between the education and training policy which insists ICT to be taught in all secondary schools including public and private schools with what happening in Tabora where some schools teach ICT as a subject and some schools do not teach.

Population

The targeted populations in this study were head teachers, second masters, academic teachers, discipline teachers, students and the ICT department at the District level, from the selected secondary schools at Urambo District Council in Tabora Region. This study involved these respondents because they were responsible for supervising the implementation of ICT policy at the school level. While the ICT department at the District level ensures and proposes types of ICT equipment in terms of quality and functionality before use, and students for validation of data. The targeted populations were 23 public secondary schools, 128 teachers, 13000 students, 92 school administrators and 6 ICT staff.

Sample Size

In a qualitative research approach, the researcher selects respondents purposively who can provide potential data for the study. This study used a total of 40 respondents, including 2 Head teachers, 2 second masters, 2 academic teachers, 2 Discipline teachers, 22 students, 9 teachers and 1 staff member from the ICT Department. The researcher employed students to validate the responses which were provided by school administrators on infrastructure limitations on ICT Implementation in secondary schools. The number of students was low because the focus of the study was on school administrators.

Sampling Techniques and Procedures

The study used purposive sampling to select heads of the schools, second masters, academic masters, discipline masters and ICT staff. Simple random sampling to select teachers, students and schools.

Data Collection Tools

The primary research tools for this study's data collection method were questionnaires for teachers and students, interviews for ICT personnel and school administrators.

Research Trustworthiness

To ensure the trustworthiness of research instruments, the researcher reviewed the data collection tools with other researchers for further improvement.

Data Collection Procedures

The researcher received a permission letter for recognition from Tumaini University Makumira to the District Executive Director (DED) of Urambo for requesting permission to collect data. Then, the researcher visited the selected secondary schools, which were used as representatives of Urambo District, to arrange a timetable for data collection, where the researcher used interviews to collect data from school administrators and ICT staff. Questionnaires were used for teachers and Form Two students.

Data Analysis Procedures

The study used thematic analysis techniques and data from questionnaires were analysed using descriptive statistics analysis by using SPSS.

Ethical Considerations

The study followed all procedures required by picking an introduction letter from Tumaini

University Makumira to the District Executive Director, thereafter another introduction letter from the District Executive Director, which introduced the researcher to the schools for data collection, before attending the selected schools for data collection.

The researcher also ensured the quality and integrity of the research by obtaining informed consent. The study observed privacy and secrecy, as well as avoided bias of the respondents and participants who were in the study. Lastly, the issue of plagiarism was discouraged as research ethics do not encourage the use of other words without acknowledging them. The obtained results were disseminated through online publication and printed documents were returned to the area of the study.

RESULTS

This chapter presents the research findings of the study which aimed to determine the ICT infrastructures limitations in the implementation of ICT Policy in public secondary at Urambo District Council. The participants were school administrators, teachers, students and IT staff from district level. Data were collected through questionnaire and interview guide and analysed through thematic and descriptive analysis.

Table 1: Respondents Return Rate

S/N	Category	Planned respondents	Obtained respondents
1	IT staff	6	1
2	Students	26	22
3	School Administrators	8	8
4	Teachers	12	9
	Total	52	40

Source: Field data, 2025

Table 1 shows that the researcher planned to use a sample size of 52 research participants. During the data collection, the researcher archived to get 40 research participants out of 52. Because the nature of the study is qualitative, it requires a small sample size. In order to get the percentage of respondents' return rate, the researcher divided 40 by 52, then

multiplied by 100% to get 76.92%. 76.92% of respondents' return rate was enough for the researcher to proceed with data analysis. According to Habiyu and Njuguna (2025), a 75% return rate of tools is adequate for the study.

Background Information of Research Participants

Background information of research participants includes features such as gender, age, educational

levels for teachers and students, as well as working experiences for teachers. The researcher used a total of 40 respondents, including 8 school administrators, 1 ICT staff, 9 teachers and 22 students.

Table 2: Demographic Information

Aspect	Category	Frequency (F)	Percentage (%)
Gender	Male	24	60
	Female	16	40
Age	11-20 years	22	55
	21-30 years	2	5
	31-40 years	7	17.5
	41-50 years	9	22.5
	51 and above	-	-
Education level	Form two	22	55
	Diploma	1	2.5
	Bachelor degree	17	42.5
	Master degree	-	-
	PhD	-	-
	Others	-	-
Working experiences	Nil	22	55
	Less than 3 years	2	5
	4-5 years	3	7.5
	6-10 years	7	17.5
	11 and above	6	15

Source: Field data 2025

Table 2 shows that among 40 respondents who were used to provide data for the study, 24(60%) were males and 16(40%) were females. This implies that in secondary schools, male teachers are more compared to female teachers. Another aspect was the ages of respondents, where 22(55%) of respondents were aged of 11-20 years who were students, 2(5%) aged between 21-30 years, 7(17.5%) of respondents aged between 31-40 years and 9(22.5%) aged between 41-50 years. This implies that in secondary schools, digital age teachers are more compared to others. This reveals that most teachers are interested in the use of science and technology in education.

Educational level of research participants. Among the research participants who were used as respondent's 1 had a diploma level, 17 had a bachelor's level degree. This implies that most

teachers are knowledgeable and possess adequate skills in ICT compared to others due to differences in the level of education.

The researcher selected 22 students to provide data who were in Form Two (II). The Form Two (F2) students were selected because for them ICT subject is compulsory and all of them are studying the ICT subject and they provided data which were reliable. For the upper classes (Form III and Form IV), ICT is an optional subject that some students are not taking.

On the aspect of working experiences, 22(55%) of respondents had no working experience. 2(5%) of respondents had working experiences of 3 years, 3(7.5%) had working experiences of 4-5 years, 7(17.5%) had working experiences of 6-10 years and 6(15%) had working experiences of 11 and

above years. This implies that teachers have knowledge and skills related to ICT through experience.

ICT Infrastructure Limitations in the Implementation of ICT Policy

Under this section, the researcher discussed different sub-themes which underlying the main theme which aimed to assess the infrastructures

pitfalls in supporting the implementation of ICT policy such as; availability of computer laboratory in schools, availability of ICT facilities in teachers' office, accessibility of ICT facilities by teachers in schools, government support, internet, computer availability, photocopy machines, projectors, printer, national electricity grid, solar power, generators, reliability of electricity, power shortage, wind power, biogas and geothermal power.

Table 3: ICT Infrastructure Limitations of the Implementation of ICT Policy

S/N	Item	S. Disagree		Disagree		Agree		S. Agree		Mean
		F	%	F	%	F	%	F	%	
1	National electricity grid	2	6.5	1	3.2	6	19.4	22	71	3.55
2	Photocopy machine	-	-	-	-	18	58.1	13	41.9	3.42
3	Reliability of electricity	-	-	1	3.2	19	61.3	11	35.5	3.32
4	Computer availability	1	3.2	1	3.2	19	61.3	10	32.3	3.23
5	Printer	-	-	2	6.5	20	64.5	9	29	3.23
6	Power shortage	-	-	3	9.7	20	64.5	8	25.8	3.16
7	ICT facilities accessibility	2	6.5	2	6.5	18	58.1	9	29	3.10
8	ICT facilities in offices	4	12.9	1	3.2	18	58.1	8	25.8	2.97
9	Solar electricity	6	19.4	9	29	8	25.8	7	22.6	2.53
10	Government support	6	19.4	5	16.1	19	61.3	1	3.2	2.48
11	Projector	12	38.7	5	16.1	5	16.1	9	29	2.35
12	Internet	18	58.1	4	12.9	6	19.4	3	9.7	1.81
13	Generator	16	51.6	12	38.7	3	9.7	-	-	1.58
14	Router	6	66.7	2	22.2	1	11.1	-	-	1.44
15	Geothermal power	23	74.2	7	22.6	-	-	1	3.2	1.32
16	Biogas	25	80.6	5	16.1	-	-	1	3.2	1.26
17	Computer laboratory	26	83.9	4	12.9	1	3.2	-	-	1.19
18	Wind power	27	87.1	4	12.9	-	-	-	-	1.13
Overall mean										2.213

Source: Field Data 2025

The researcher aimed to assess the availability of the national electricity grid in schools as a source of power for running ICT facilities. The mean of the question item was 3.55 in Table 3, indicating that respondents strongly agreed on the availability of the national electricity grid. This does not affect the implementation of the ICT policy because it produces highly reliable power. This might be happening as a result of easier in its easier accessibility. The IT staff said that *“all schools are connected with the national grid electricity, which supplies reliable electricity for running ICT tools in schools”* (interview with IT staff on April 16, 2025).

Another school administrator from school B said that *“the electricity which is being supplied is reliable”* (interview with the school administrator 3 on April 11, 2025).

The mean of 3.42 in Table 3 indicates that the majority of respondents strongly agreed on the availability of a photocopy machine. This does not affect the implementation of the ICT policy. This implies that the photocopy machines are highly available to support teaching and learning ICT skills. This contrasts with the interview data from the school administrator of school B, who said that

“our school received one photocopy machine from the government, which makes it difficult for each student to develop knowledge and skills on how to operate it” (interview with the school administrator 3 on April 11, 2025). Interview data reveal that photocopy machines are not enough to support ICT training in secondary schools.

Research participants were asked to rate the reliability of electricity to support ICT facilities. The mean of the item was 3.32, which shows that researchers agreed that the electricity is reliable, as shown in Table 3. This does not affect the implementation of ICT policy in secondary schools. This implies that electricity was moderately highly reliable, as the majority of respondents agreed. This might be happening due to the availability of credible sources of electricity. The interview with the IT staff said that *“all schools are connected with the national grid electricity, which supplies reliable electricity for running ICT tools in schools”* (interview with IT staff on April 16, 2025). Another school administrator from school B said that *“the electricity which is being supplied is reliable”* (interview with the school administrator 3 on April 11, 2025). Data from the interview reveals that electricity is reliable in schools for supporting the training of ICT.

The researcher aimed to assess the availability of printers in schools to support teaching and learning of ICT in schools. Table 3 shows that the mean of the item was 3.23, which indicates that most of the respondents agreed on the availability of printers. This does not affect the implementation of ICT policy in schools. This might be happening due to the availability of stakeholders' support in the provision of ICT facilities. The school administrator of school B said that *“our school has two printers, where one printer is used by the head of the school and another is used in the academic office”* (interview with the school administrator 2 on April 11, 2025). Another administrator from school A said that *“our school has one printer that is not*

enough for fulfilling all the tasks” (interview with school administrator 1 on April 9, 2025).

The researcher aimed to assess the availability of computers in schools. The mean of the item was 3.23, which shows that respondents agreed that computers are moderately highly available in schools, as revealed in Table 3. This does not affect the implementation of the ICT policy. This might be happening due to government support by providing computers and financial support for the improvement of ICT studies in secondary schools. From the interview with the school administrator of school A said that *“the government has provided five desktop computers in our school for supporting ICT studies”* (interview with school administrator 4 on April 9, 2025). Data from the interview reveals that computers which are given by the government are not enough compared to the number of students and teachers.

Respondents were required to respond if they experienced a power shortage in teaching and learning ICT in schools. Table 3 indicates that the mean of the item was 3.16, which shows that respondents agreed that they experience a power shortage. Power shortage affect moderately high the implementation of ICT policy in secondary schools. This implies that most schools experience a power shortage. This might be happening due to a difference in geographical location, where some schools are located in areas with good infrastructure, and they do not experience power shortages, while some schools are located in areas with limited electricity infrastructure. During the interview with one administrator from school A said that *“our school experiences power shortage when the electricity infrastructures get destroyed due to heavy rainfall, which makes difficult to use ICT tools in facilitation of students teaching and learning”* (interview with school administrator 1 in April 9, 2025). Another administrator said that *“lessons are being postponed when electricity cut off during the ICT session”* (interview with the school administrator 2 in April 9, 2025). Data from

the interview reveals that schools experience a power shortage, which affects the implementation of the ICT policy.

Table 3 indicates that the researcher aimed to assess teachers' access to ICT facilities when they plan to use them. The mean of the item was 3.10, which shows that respondents agreed that easy access to ICT facilities was moderately high. This does not affect the implementation of the ICT policy. Teachers easily access the ICT facilities due to the favourable conditions of using the ICT facilities. From the interview with the school administrator of School A said that *"some teachers easily access the ICT facilities, especially those whose offices are equipped with ICT facilities"* (interview with the school administrator 2 on April 9, 2025).

Respondents were being asked to provide answers if all offices are equipped with ICT facilities, as revealed in Table 3. The mean of the item was 2.97, which indicates that respondents agreed that the offices are equipped with ICT facilities, which enhances the implementation of the ICT policy moderately high. This implies that most of the respondents agreed that teachers' offices are equipped with ICT facilities. This might be happening due to the availability of personal computers owned by teachers individually and used in assisting the teaching and learning of students. Also, some of the offices are not equipped with ICT tools because of the prioritisation of those few available ICT facilities in a few offices. From the interview with the school administrator, School A said that *"some offices are equipped with ICT facilities, including the offices of the head of the school, the second master and academic offices. Although, there is a shortage of ICT facilities in some of tools in some of teachers' offices"* (interview with the school administrator 1 in April 9, 2025). From school B school administrator said that *"staff offices are not well equipped with ICT facilities"* (interview with school administrator 4 in April 11, 2025).

Respondents were required to respond to the availability of solar power as a source of power in schools to support ICT subjects. The mean of the question item was 2.53, which indicates respondents agreed on the availability of solar power in schools for the generation of power, as shown in Table 3. This implies solar power is used in the generation of electricity in some schools and some schools do not have solar power for running ICT facilities in teaching and learning, which makes it difficult for them to proceed with lessons when the electricity is cut off, leading to failure in achieving the learning objectives. This is contrary to the interview data, which reveals that all schools lack solar electricity, as one of the school administrators from school A said that *"the school does not depend on solar electricity at all"* (interview with school administrator 2 on April 9, 2025). Also, the researcher did not observe solar Panels on the roofs of the classes' buildings. This reveals that the absence of power greatly affects the implementation of ICT policy in schools.

In Table 3, the researcher assessed whether the government provide support in schools for enhancing ICT use in schools, where the responses were as follows. The mean of the item was 2.48, which indicates that respondents disagreed on the support which is provided by the government. This limits the implementation of ICT policy as the support which is provided by the government was moderately low. A school administrator from school A said that *"the government support the school to enhance ICT use to a low extent"* (interview with school administrator 1 on April 9, 2025). A school administrator from school B said that *"the government support the school to enhance ICT use by providing ICT facilities, including desktops, tablets to teachers and photocopy machines"* (interview with school administrators 2 on April 11, 2025). Another school administrator said, *"The government provide support to some extent"* (interview with the school administrator 3 on April 11, 2025).

The research participants were required to respond to the presence of projectors in schools to support ICT training. The mean of the item was 2.35, which indicates that respondents disagreed on the availability of projectors as revealed in Table 3. This moderately affects highly the implementation of ICT policy in secondary schools. This implies that most schools lack projectors for supporting teaching and learning. This might be happening due to a shortage of funds for buying projectors. Also, the school administrator from school B said that *“projectors are not available for displaying the information. Teachers use chalkboard for teaching and learning”* (interview with the school administrator 1 on April 9, 2025).

The respondents were asked about the availability of the internet in schools. The mean of 1.81 in Table 3 reveals that respondents disagreed on the availability of the internet. This moderately affects high the implementation of ICT policy as in most schools, internet connectivity is a problem which limits teaching and learning of ICT, especially in online learning programs. This might be happening due to the absence of school funds, which could be used to buy bundles. Few schools have internet connectivity for enhancing ICT teaching and learning. From the interview with the school administrator of school B said that *“infrastructures for supporting internet connectivity are not available”* (interview with the school administrator 4 on April 11, 2025).

Table 3 shows that research participants were required to respond to the presence of a generator to support the training of ICT in schools. The mean of the item was 1.58, which indicates that respondents strongly disagreed on the availability of a generator as a source of power, which highly affects the implementation of ICT policy. This might be happening due absence of funds, which can be used to buy generators. Also, other schools had a generator to support power generation. Those generators might be available as a result of capitation grants. From the interview with the IT

staff said that *“some schools use generators as a source of power and some schools do not have generators”* (interview with IT staff on April 16, 2025). Also, an administrator from school A said that *“the school has one generator for generation of power, which is used when the national grid electricity cuts off”* (interview with school administrator 3 on April 9, 2025). A school administrator from school B said that *“we have no generator”* (interview with school administrator 4 on April 11, 2025). Data from the interview reveals that some schools have generators and some other schools lack generators for the generation of power.

In Table 3, the respondents were asked about the availability of routers in schools. The mean of the item was 1.44, which reveals that respondents strongly disagreed on the presence of a router. This highly affects the implementation of the ICT policy. This might be happening due to the absence of school funds, which could be used to buy a router and bundles. From the interview with the school administrator of school B said that *“routers for supporting internet connectivity are not available”* (interview with the school administrator 4 on April 11, 2025).

The researcher aimed to assess the presence of geothermal power in schools to support teaching and learning of ICT in schools. The mean of the item was 1.32, which indicates that respondents strongly disagreed on the availability of geothermal power as a source of power for running the ICT tools, as shown in Table 3. This limits the implementation of the ICT policy very highly. This reveals that most schools do not use geothermal power as a source of power for running ICT facilities. This might be happening due to the unconducive geographical conditions for the generation of geothermal power. From the interview with the school administrator of school A said that *“school does not use geothermal as a source of power generation for running ICT devices”* (interview with the school administrator 1 on April 9, 2025). Also, an administrator from school B said

that “*there is no infrastructure to support generation of geothermal power*” (interview with school administrator 3 on April 11, 2025). Data from interviews confirmed that geothermal power is not available in schools.

The researcher assessed the availability of biogas for enhancing teaching and learning of ICT in schools. The mean of item 1.26 in Table 3 shows that respondents strongly disagreed on the availability of biogas for running ICT devices. This hinders the implementation of ICT policy in secondary schools at a very high rate. This reveals that most schools do not use biogas as a source of power, as 80.6% strongly disagreed on the availability of biogas. This might be happening due to the absence of domesticated animals, which can be used as a source of manure in the production of power or the absence of a professional who can construct the biogas infrastructures. During the interview with the school administrator from school A said that “*our school has not constructed the setups for enhancing production of biogas*” (interview with the school administrator 2 on April 9, 2025). Another school administrator from school B said that “*it is difficult to construct biogas because the funds which are provided by the government are not sufficient*” (interview with school administrator 3 on April 11, 2025). Data from the interview shows that biogases are not available in schools.

Table 3 indicates that the researcher aimed to assess the availability of computer laboratories in schools. The mean of the item was 1.19, which indicates that respondents strongly disagreed on the availability of a computer laboratory in school. This hinders the implementation of the ICT policy highly. This implies that most schools lack a computer laboratory for supporting teaching and learning of ICT in schools, as 83.9% of respondents strongly disagreed. This might be happening due absence of funds, which could be used for the construction of computer rooms where students and teachers can practice their knowledge. From the interview with

the school administrator of school B said that “*there is no computer laboratory, normal classrooms are used instead of a computer laboratory*” (interview with school administrator 2 on April 11, 2025).

The researcher assessed the availability of wind power as a source of power for running ICT facilities in schools in Table 3. The mean of the item was 1.13, which shows that respondents strongly disagreed on the availability of wind power as a source of power for running ICT facilities. This highly affects the implementation of ICT policy in schools. This implies that not all schools use wind as a source of power to support ICT training in schools. This might be happening due to unfavourable climatic conditions for the generation of electricity through wind. During the interview with the administrator of school A said that “*the wind is moving with low speed, it will be difficult to set up equipment for the generation of power, which requires wind with high speed*” (interview with school administrator 4 on April 9, 2025). Administrator school B said that “*the school does not use wind power, it depends much on the national grid electricity*” (interview with the school administrator 2 on April 11, 2025).

DISCUSSION

The researcher discussed the common infrastructure limit which affected the implementation of ICT policy in public secondary schools, are wind power, computer laboratory, biogas, geothermal power and router.

Absence of alternative sources of power (wind power, biogas and geothermal power). The findings revealed that the majority of respondents strongly disagreed on the availability of alternative sources of power, such as wind power, biogas and geothermal power, as school administrators reported that they rely heavily on the national electricity grid, which brings a problem when damage occurs in the system, which affects the implementation of the ICT policy effectively. The findings of the current study go hand in hand with

Joseph (2021), who found that lack of standby power is one among the challenges which affect the use of ICT in secondary schools. In comparison with the resource-based view theory insists that a company should innovate new strategies of product development based on its strengths for competitive advantage (Bhandari et al., 2022). This implies that secondary schools should come up with their own strategies for enhancing alternative sources of power. This can be achieved through fundraising and income-generating activities.

Availability of computer laboratories in schools. Respondents strongly disagreed on the presence of a computer laboratory in school, which limits the implementation of ICT policy in secondary schools, as respondents reported that normal classes were used instead of the computer laboratory. Schools experience a shortage of funds for the construction of a computer laboratory where students and teachers can practice their knowledge. Wanjiku (2022) insists that IT rooms available in schools are not enough compared to the number of students in the school environment. Fidelis and Onyango (2021) conducted a study on the availability of ICT infrastructures and teachers' competence in the use of ICT among secondary schools and found that computer laboratories are among the infrastructures which are found in schools. The study insists that the government needs to provide funds to be used to buy ICT facilities in schools. In comparison with the resource-based view theory, schools should be equipped with computer laboratories for effective training of ICT subjects in secondary schools. When resources are not available, it becomes difficult for teachers to impart knowledge efficiently (Bhandari et al., 2022).

Availability of routers in schools. The findings reveal that respondents strongly disagreed on the availability of routers, which affects the teaching and learning of ICT subjects. Schools experience a shortage of funds which could be used for ensuring accessibility of bundles and routers. This tends to affect teaching and learning of online programs,

which require internet accessibility for completion. Okello et al. (2020) insist that internet connectivity is a very important setup to be available in schools for effective teaching and learning by using ICT devices. The study highlights the importance of internet accessibility in secondary schools in the implementation of ICT policy. Moreover, Jay Barney (1991) insists that schools to have their resources, if routers are not available in the school environment as a resource for enhancing the training of ICT to students, it is difficult for them to attain ICT skills efficiently, especially in online learning platforms.

On the other hand, the presence of a national electricity grid in schools enhances the implementation of ICT policy as respondents strongly agreed on its accessibility for producing reliable electricity. All schools are connected to the national electricity grid as a main source of power for running ICT tools. This goes hand in hand with Nduwayezu et al. (2022), who found that adequate electricity facilitates integration of ICT in secondary schools through running ICT devices such as computers, laptops, printers and projectors. This is hand in hand with resource-based view theory, as the national electricity grid is available in schools for effective implementation of ICT as a resource which produces reliable electricity. This implies that schools which rely on the national electricity grid as a source of power have higher accessibility of achieving the goals of ICT policy implementation compared to those that depend on other sources.

CONCLUSION

The study concluded that infrastructures which are available in the school environment are not enough for effective implementation of ICT policy due to the overall mean of 2.213, which implies that the majority of respondents disagreed on the availability of infrastructures in schools. Some strategies such as provision of ICT facilities, ensure ICT training and workshop to all teachers, students' motivation in ICT subjects, curriculum

improvement, ensuring power sustainability for running ICT tools, providing clear guidelines and regulation for use of ICT tools and construction of ICT infrastructures are supposed to be done in school environment for effective implementation of the policy.

Recommendation for Studies

Further researchers could investigate the level of implementation of ICT policy in private secondary schools.

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