Information Communication and Technology Resource Availability and Integration in Instruction among Secondary Schools in Habaswein Sub-county

Kusow M. Nadhif [a++*], Ahmed Osman Warfa [a#] and Rosalia Mwikali Mumo [a†]

[a] School of Education, Arts and Social Sciences, Garissa University, Kenya.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Incorporation of Information, Communication and Technology (ICT) in learning has been established as crucial for enabling teachers to replace traditional methods of teaching with technology-enabled education facilities. In Kenya, under vision 2030, ICT is deemed to be among the key elements essential for transforming the nation's development. The Ministry of Education, through the Education Blue print dated 2013-2025, highlights the essence of technology-aided

_____

[++] *M.Ed Scholar;*
[#] *Professor and Lecturer;*
[†] *Lecturer;*
Corresponding author: E-mail: mwalimukusow@gmail.com;

teaching and learning in the school's national curriculum. This study aims to examine the availability of instructional ICT resources in government secondary schools in Habaswein sub-county Descriptive survey design was employed in this study. The study targeted nine secondary schools in the region. Piloting of study was carried out in Sarif Mixed Day Secondary School within Habaswein Sub-County. Data was gathered using semi-structured interviews and questionnaire to allow the respondents present their unbound views about the issue being explored. The qualitative data collected was analyzed using thematic data analysis method while quantitative data obtained was analyzed using SPSS. The study concludes that information communication and technology resource availability has a significant association (r = 0.644, p<.001) with ICT integration in instructions. The study recommends for provision of adequate ICT resources for effective ICT integration in in instructions in public secondary schools in Habaswein Sub- County.

1. INTRODUCTION

1.1 Background Information

It is often acknowledged that the integration of ICT in learning and teaching methods seeks to improve both student and teacher effectiveness by helping both parties access the knowledge needed for the sessions [1]. In order to use ICT-based tools and technologies for interactive learning, information and communication technology (ICT) integration in teaching is indispensable [2]. Teachers are able to employ electronic devices and technology integration to design and adapt instructional materials to better match the needs of individual students [3]. The drastic growth of the worldwide economy as well as information-based society has pressured education systems globally to integrate ICT in teaching the skills, attitudes and knowledge that they required in the 21st century [4]. Additionally, the advance in ICT sector has dared teachers to get prepared for efficient deployment of the novice learning and teaching tools in their day-to-day teaching tasks [2].

On this premise, reference teachers are thought to be the main agents in integrating ICT into the classroom to get students ready for the modern digital world [5]. Importantly, the goal of ICT integration is to improve the quality, affordability, and accessibility of instruction provided to learners. The integration of ICT in instructions as well as training has been prioritized in most countries, especially in Europe over the last decade, but no even advancement has been made Murugesan [4].

Worldwide educational systems are adopting ICT-based instruction and, moreover, integrating a variety of courses within the curriculum [6]. As

Hennessy [7] remarked, most schools in developed economies such as UK, have embraced the deployment of ICT in education and showed high level of improvement in academic performance. Murugesan [4] remarked that such countries have integrated ICT into their education systems for instructions due to its insightful influence such as allowing students and teachers to construct multisensory and shared environments with unrestricted learning and teaching potential. Internet and computers can be deployed to enhance teacher's subject master and basic skills, offer resources which can be later used in classroom, and also help teachers familiarize with particular instructional methods [8]. Furthermore, ICT can add value to education and support more efficient teaching methods to offer knowledge for students by improving communication that fosters learning).

As Gardner [9] noted, most developing economies in Africa are still living in environment of technological deficiency characterized by lack of adequate access to quality knowledge acquired through the Internet. Nevertheless, if Africa intents to prepare its people for the 21st century challenges, it ought to do this by integrating ICT to tap novice, attractive, diversified, and promising potentials. New Partnership for African's Development (NEPAD) emphasized that ICT can play an essential role in helping students gain knowledge and skills in education [4].

In Kenya, the Government acknowledged that an ICT knowledgeable workforce is the basis for which the country can attain a high economy status [6]. As a result, the government has made education the basic avenue for equipping the country with ICT skills with a view to create a sustainable and vibrant economic growth. In

2006, Kenya launched the National ICT policy in response to the matter raised in sessional paper No. 1 of 2005 to the ministry of Education (MoE) [10]. However, the policy framework for MoE shows that there are various challenges related to access to and the deployment of ICT in Kenya, including limited rural electrification, power disruption, and poverty as pointed out by Ochieng and Miima [10]. Consequently, although some public secondary schools have computers, the majority of them only consist of few resources used for administrative purposes. In other words, few schools have inadequate ICT equipment for students and teachers.

In arid and semi-arid areas including Wajir County, most government high schools hardly have computers while others have a few computers for use in administrative tasks [10]. Indeed, even the secondary schools in Wajir that have computers, the computer-student ratio is 1:150 [10]. Nonetheless, currently, the status of integration of ICT in learning and teaching in Habaswein Sub- County is not known, which forms the basis of the proposed study.

Notably, ICT has the power to improve learning by creating new opportunities and revolutionizing the way education is provided [11]. This is only possible whenever teachers, who remain the primary agents of learning, have acquired and used the pedagogical skills required for delivering instruction via the use of ICT resources. Effective learning depends on the teacher's willingness and ability to give courses in an instructional manner [12]. Additionally, ICT resources are tools for delivering instruction that are used in the classroom to explore, examine, solve issues, interact, reflect, reason, and acquire concepts [13].

1.2 Statement of the Problem

The World Bank and UK ascertained that ICT availability of resources can improve students access to education, thereby broadening access to quality education for emerging economies. Basically, ICT in education endorses information literacy or the capacity to access, use, and examine information from diverse sources in order to improve instructional delivery, generate new knowledge and address issues. However, ICT introduction in Kenya education system lags behind desire and expectations. While some government high schools in the country have some computer facilities, only a small proportion has basic ICT resources essential for learning and teaching. The availability of ICT resources in teaching-learning is crucial for the effective integration of ICT in teaching and learning. Nevertheless, it is unclear whether educational institutions Habaswein Sub-County, Wajir County use ICT to enhance instruction and education in the classroom. Although some researches including Gathano [14] and Waiti [15] have showed remarkable progress in the incorporation of ICT in education systems in developed countries and remarkable trend in the same direction in some African countries, Njaari (2011) and Hennessy et al. [7] posit that limited research has exclusively examined the status of ICT incorporation in secondary schools in Wajir County, particularly resource availability and ICT integration in instructions in Habaswein Sub-County. Therefore, this study seeks to investigate the integration of ICT for instruction in government high schools based on these variables in Habaswein Sub-County, Wajir County.

1.3 Purpose of the Study

The prime purpose of the study is to determine the status of the integration of ICT for instructions in high schools in Habaswein Sub- County, Wajir County.

1.4 Objectives of the Study

The study was guided by the following objectives: -

i)   To establish the available ICT resources in instruction in secondary schools in Habaswein Sub- County
ii) To determine the accessibility of ICT resources in instruction in secondary schools in Habaswein Sub- County
iii) To establish the: ICT infrastructure for use in instructions in secondary schools in Habaswein Sub- County
iv) To explore challenges faced by teachers and students in the integration of ICT in instructions

1.5 Research Hypothesis

H_{01}: ICT Resource availability affects ICT integration in instructions in government secondary schools in Habaswein Sub- County.

2. LITERATURE REVIEW

2.1 Theoretical Framework

The main theories commonly used in the study of integration of ICT in instructions include

constructivism, behaviorism, and cognitive psychology. However, Suhendi [16] suggests constructivist learning theory as the most suitable one for the deployment of ICT in learning and teaching, hence, the current study was anchored on this theory. Constructivist learning theory is anchored on psychology of education. Jean Peaget (1896-1980) deemed children as developers of their intellectual structures while Vygotsky, a psychologist (1896-1934) explored ways in which children learn through communication with their peers and parents. The psychologist underscored that learning occurs by learners completing activities or activities for which support is needed. The support might include peer, parent, or technology such as use of computer. Since then, this occasioned the use of the term computer-support learning [17]. According to Clark [17], computer-supported learning environment comprise the ones in which computers tools and facilities are deployed to create and sustain a conducive learning environment or support the student. These theories have been further developed by various researchers including Ahmad, Sultana, and Jamil [18] in recent years in related studies. Unlike teacher-cantered teaching and learning model where teachers impart knowledge to learners, for constructivist, knowledge cannot be forced from one knower to others' mind [17]. Against this theoretical premise, it is imperative to scrutinize various ICT resources used for improving instruction delivery in secondary schools.

2.2 Empirical Review

Availability is an important determinant of use and impact of a resource not just ICT but also any other resource. A number of researchers have explored the aspect of ICT availability for instruction in schools. In their related study, Plomp, Anderson, Law and Quale [19] pointed out that any technology needs to be affordable for efficient adoption by schools. The researchers underscored that at the national level, affordability might be limited by various elements including the high cost of putting the infrastructure in place, which is also linked to the poverty issue [19]. In their study, Karunakaran and Dhanawardana [11] discovered that there are disparities in the availability of ICT resources among schools, that teachers' access to ICT resources is difficult, and that they have problems developing their ICT skills. The research additionally showed that lack of facilities for computer maintenance and repair, as well as insufficient ICT resources, provide challenges for

teachers utilizing ICT in the teaching-learning process. These studies offer insightful knowledge about the importance of teacher ICT skills on ICT incorporation to learning and teaching. However, they were more concerned on teacher levels of ICT skills in their areas of study.

Access to ICT tools and related resources is a common challenge in many schools. In a study exploring the issue of access to ICT among schools, Cuban [20] uncovered that placement of computer facilities within school and teachers' reach was very essential to enable teachers and students improve their ICT potential. Similar views were presented by Preston and Cox (1999) in their study conducted to assess factors associated with the acceptance of ICT in education. Teachers must have access to current ICT resources, including software and hardware, in order to use ICT in the classroom appropriately and sufficiently. Consequently, in order for instructors to effectively incorporate ICT into their lessons, they need to have easy-to-use hardware and software resources for hands-on learning, computer-generated simulations, demonstration, and lectures. The successful integration of ICT resources in education is not contingent upon their accessibility. This is due to various obstacles, including inadequate ICT infrastructure, insufficient high-grade hardware, inappropriate educational software, and restricted access to ICT resources. Teachers face issues related to making bad decisions about hardware and software selections and failing to take classroom teaching effectiveness into account. Furthermore, most educators concurred that teachers are prevented from utilizing ICT by a lack of resources in the school and time for software reviews.

3. RESEARCH METHODOLOGY

3.1 Research Design

The researcher used descriptive survey design. Based on Kothari's [21] view, descriptive research design allows description of events as they are during a particular study or at the period of research. This study design was suitable for the proposed study it requires original data from the participants to describe the incorporation of ICT for instructions delivery in high schools in Habaswein sub-county, Wajir County, Kenya. According to Orodho (2003), a descriptive research design attempts to offer precise description of parameters of a given study. Additionally, survey is deployed to gather data

from members of a target population to understand the status of the concerned population in the set variables [22].

3.2 Methodology Choice

This study used qualitative and quantitative research method also known as mixed method research. Mugenda and Mugenda [22] suggested the use of this method terming it important to obtain rich data for detailed analysis of the given research issue. In this study, qualitative data obtained from interviews were ascertained using numerical or quantitative data from questionnaires. The logic for using mixed method research is to address drawbacks associated with individual methods if only one of them were used. Mugenda and Mugenda [22] suggested the use of both methods to address biases associated with qualitative data as humans might not offer completely honest information. The study was undertaken in two phases. The first phase was qualitative research. That is, first, the researcher undertook qualitative study which involved interviews. Then, the results obtained were integrated with quantitative data obtained using questionnaire for verification to get the final results.

3.3 Target Population

Mugenda and Mugenda [22] described population as the whole group of people with shared observable traits. The study targets deputy principals, teachers and students in Habaswein Sub-county. All the study participants were selected from eight public secondary schools in Habaswein sub-county. The logic of using these categories of respondents is because they are directly involved in one way or another in the incorporation of ICT in instructions.

3.4 Sample Size and Sampling Method

Sampling involves choosing a sample from a predetermined population to obtain a sample that accurately represent the population [23]. The researcher used simple random sampling combined with purposive sampling method. All the nine public secondary schools in Habaswein Sub-county were chosen for this study. Also, the school deputy principals were selected purposively to partake in this study based on their accessibility and availability. This sampling approach minimized biased selection of the representative respondents by giving everyone equal chances of being chosen.

The sample size included secondary schools, teachers, school deputy principals, and students. This is summarized in the Table 1. According to Gay [24], 20% of a given population is a representation of the sample. Thirty-eight (38) teachers, nine deputy principals, and eight hundred and ten students (810) representing 30 percent of them were also selected through purposive sampling approach to aid in data collection.

3.5 Research Instruments

In this study, questionnaire and interview were used for data collection [22,25]. The logic for choosing questionnaire is that they are cost-effective and helped to collect much information from a large population in a short duration. The questionnaires are set to address ICT resources availability, and challenges teachers encounter in the implementation in secondary schools in Habaswein Sub-County, Wajir County. An interview guide is a document that gives the researcher a way to organize the manner in which he interviews potential respondents [25]. The guide aided the researcher to plan questions and ensured that every participant had the same interviewing experience. For the deputy principals, the interviews were carried out face-to-face. The questionnaires had set questions to ensure uniformity in responses and relevancy of the data collected. However, the respondents were allowed to freely express their opinions about each issue explored.

3.6 Data Analysis Methods

The study used quantitative and qualitative. The qualitative data obtained from open-ended questions were analyzed thematically. This data analysis method involved categorizing the results thematically based on research objectives. Identification of emerging themes helped in making informed conclusion on each research question. On the other hand, quantitative data from teachers' and students' questionnaires were organized, coded, and entered into Statistical Package for Social Sciences (SPSS) version 28 of 2022 for analysis. Numerical data were also analyzed using descriptive statistics including percentages and means and data presented in pie charts, tables, and bar graphs. The analyzed data were used for making conclusions and recommendations [26].

4. RESULTS AND DISCUSSION

The data gathered was analyzed quantitatively and qualitatively using descriptive content analysis and statistical analysis. This research adopted a mixed approach that is quantitative and quantitative analysis. The study sought to test whether the formulated hypothesis actually attained the goals stated in it. The Pearson's Product Moment (PPM) correlation analysis was deployed to test the hypotheses, with a 0.05 significance level and 63 (63-2=61) degrees of freedom (df). Therefore, the conclusions were presented according to the research hypothesis. The findings were presented on tables and figures.

4.1 Instrument Response Rate

The researcher interviewed 9 deputy principals, 38 teachers, and 810 students in government high schools in Habaswein Sub-County, Wajir County. The total respondents were 857. Interviews were administered to deputy principals while questionnaires were used with teachers and students. 833 of these presented completely filled instruments. This translates to a response rate of 98 percent.

4.2 Demographic Data

The researcher sought to understand the education level of the teachers involved in this research. The data was to indicate teachers' experience to address matters related to integration of ICT in instructions. The data obtained is as shown.

As evident in Table 1, the deputy Principals and teachers in secondary schools in Habaswein sub-county have different academic qualifications. The findings show that the majority (77%) of deputy principals and majority of classroom teachers (57.89%) have bachelor's degrees. 23% of the deputy Principals and 7.89% of classroom teachers have a master's degree. Only 34.22% of classroom teachers hold diploma in education.

The teachers and deputy principals were also requested to indicate the duration they have worked in their respective secondary schools. The majority (56%) of secondary school deputy principals has served for 1 to 4 years while the rest (44%) have served as deputy principals for 4 and above 7 years. On the other hand, 60.53% of the teachers have served for 1-4 years, 15.79% for 4-7 years, and the rest more than seven years.

4.3 Availability of ICT Resources in Secondary Schools in Habaswein Sub-county

This question was posed to establish the availability of ICT resources in public secondary schools in the region. The researcher asked teacher respondents to indicate the extent to which they agreed to each of the statements presented on a Likert Scale. The findings obtained were as indicated in Fig. 1.

Evidently, the majority of the respondents disagreed with the statements. Precisely, 67% disagreed that their schools are properly equipped with computer laboratories, 70% disagreed that their schools had relevant ICT manuals, and 80% of them disagreed that their schools had enough computer in line with student ratio. Only 46% of the participants agreed that their schools have stable power sources and 7% of them strongly disagreed with this statement.

Further similar question on availability and adequacy of ICT resources was posed to students. Students were asked to choose from a range of statements in a Likert Scale from 1=Strongly agree, 2 Agree, 3 Disagree, and 4 Strongly disagree that reflected the status of ICT use in their schools. The results obtained were as indicated in Fig. 2.

Table 1. Deputy principals and teachers' academic qualifications

Education level				
	Deputy Principals		Teachers	
	Frequency	Percentage	Frequency	Percentage
Diploma	0	0	13	34.22
Bachelor's Degree	7	77	22	57.89
Master's Degree	2	23	3	7.89
Total	9	100	38	100

(Researcher, 2023)

	My school has stable power sources	My school has well equipped computer laboratory	My school has relevant ICT manual for ICT implementation	There are enough computer in line with the student ratio
1 Strongly agree	33%	7%	9%	3%
2 Agree	46%	13%	14%	7%
3 Disagree	20%	67%	70%	80%
4 Strongly disagree	1%	13%	7%	10%
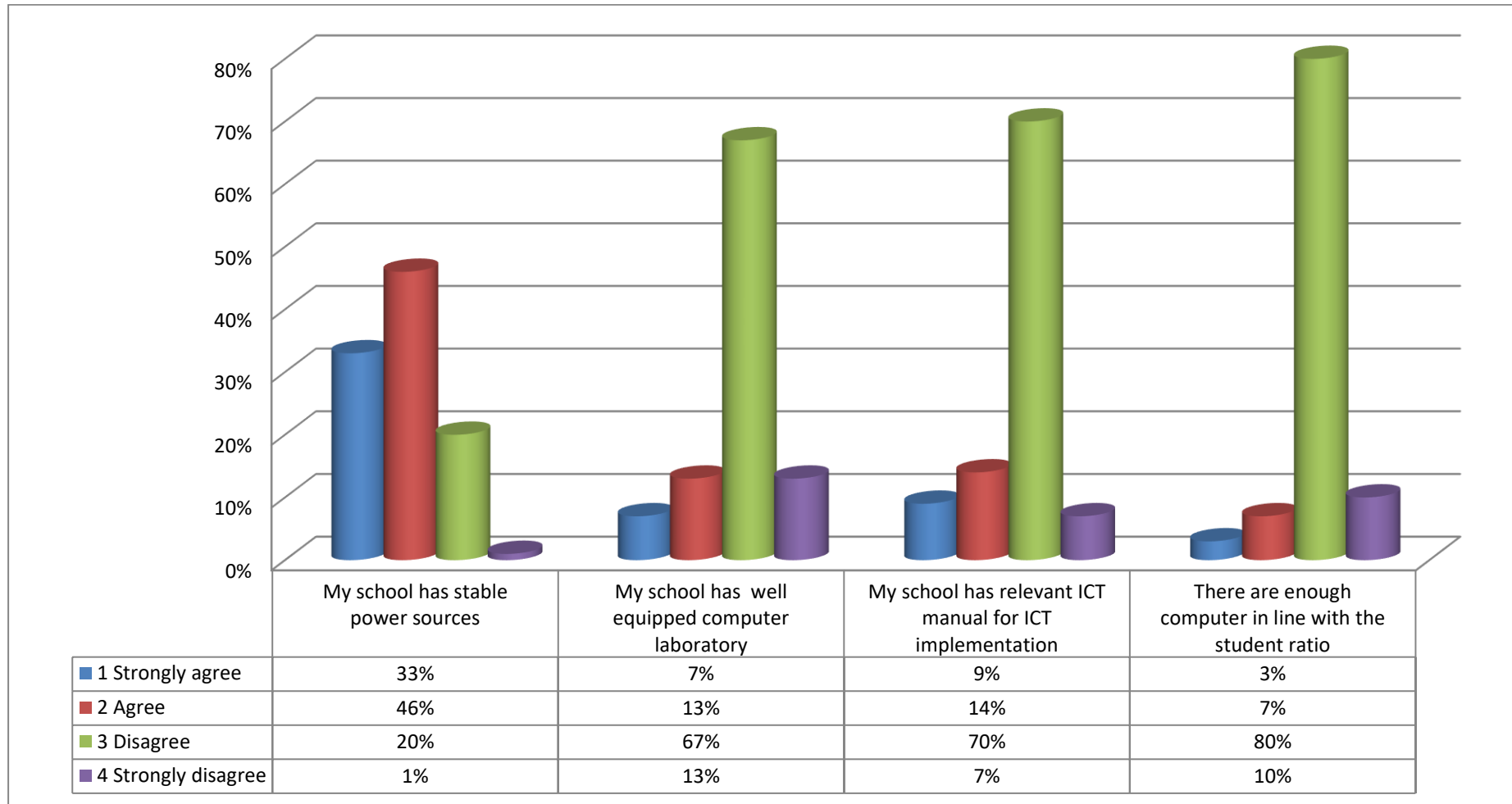
Fig. 1. Available ICT Resources
(Researcher, 2023)

	There's is a computer lesson in the school timetable where we are trained in computer use	Teachers use computers during teaching and learning	We sit for ICT exam just like any other subject	Our school has a equipped computer lab that fits well during lessons	We are allowed to access computer laboratory for our own training when free	Teachers understand correctly the use of computers while teaching	ICT is used in teaching other subjects apart from studies
■ 1 Strongly agree		11%	3%	3%	17%	33%	23%
■ 2 Agree		16%	7%	9%	33%	47%	37%
■ 3 Disagree		53%	40%	33	37%	15%	23%
■ 4 Strongly disagree		20%	50%	55%	13%	5%	17%

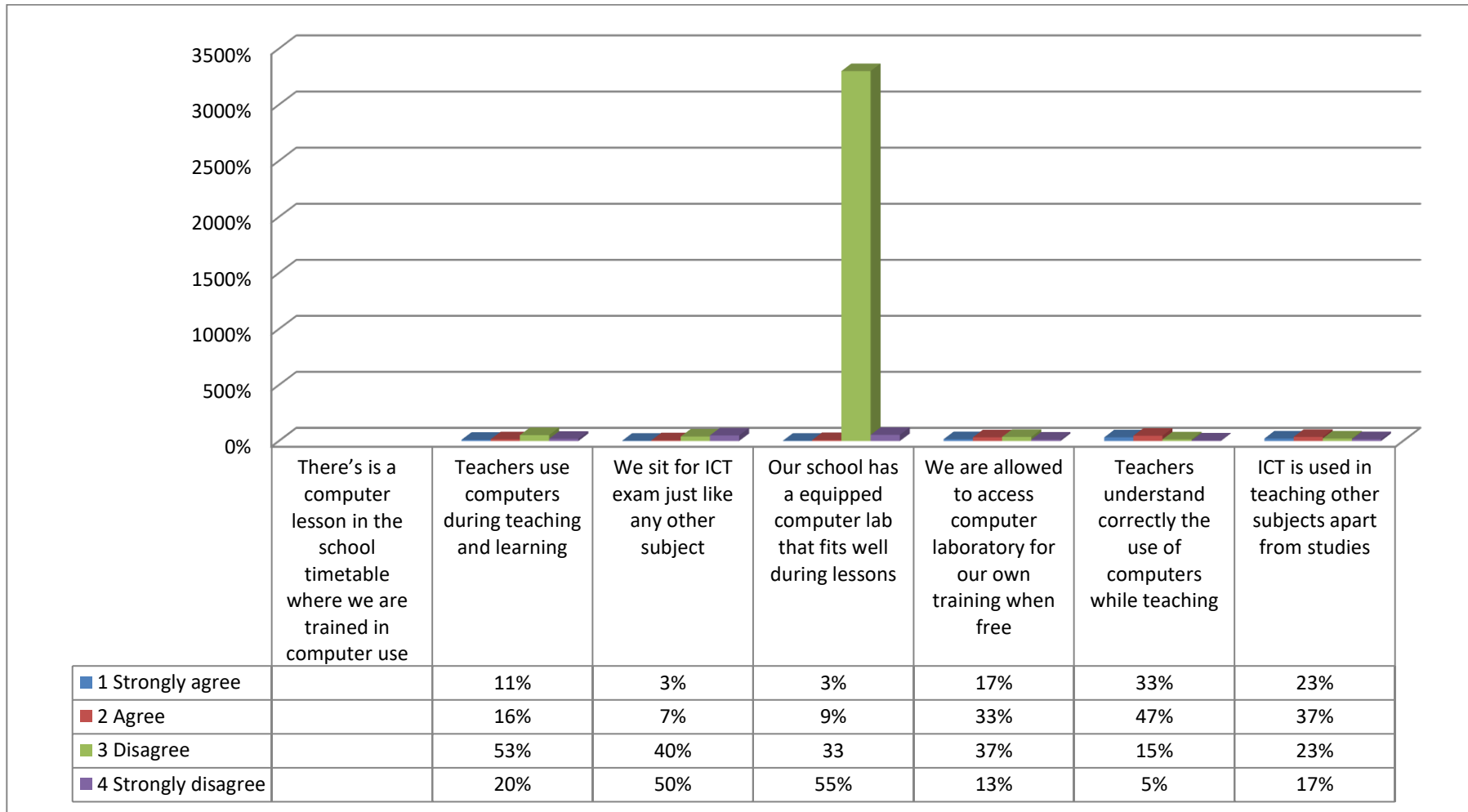**Fig. 2. ICT Resource accessibility**
(Researcher, 2023)

Table 2. ICT infrastructure for use in instructions

Questionnaire Item	M	SD
Number of computers	3.17	1.22
Power supply	3.61	1.03
Access to computers	3.49	1.18
Cost of software and hardware	3.61	1.11
Internet connectivity	3.55	0.87
ICT facility availability	**3.49**	**1.07**

(Research Data, 2023)

Table 3. Pearson's Correlation Analysis of the relationship between ICT infrastructure availability and ICT integration in instructions in public secondary schools in Habaswein Sub-County

		ICT integration in instructions	Availability of ICT facilities in Public secondary schools in Habaswein
ICT integration in instructions	Pearson Correlation	1	.644[**]
	Sig. (2-tailed)		.000
	N	38	38
Availability of ICT facilities in Public secondary schools in Habaswein	Pearson Correlation	.644[**]	1
	Sig. (2-tailed)	.000	
	N	38	38

p-value = 0.000; df= 61; r = 0.644; critical r [0.05, 61] = 1.67; α=0.05
(Research Data, 2023)

The results in Fig. 2 show that 55% of student participants strongly disagreed that their schools are well equipped with computer resources, 53% disagreed that their teachers use computer during teaching and 50% strongly disagreed that they sit for computer exams like other subjects. About 37% of the participants disagreed that they are allowed to access computers with only 47% of them agreeing that their teachers understand the use of computer in teaching.

The findings indicate that the respondents revealed that availability of ICT facilities significantly affect ICT integration in instructions in public secondary schools in Habaswein Sub-county with Mean 3.49 and SD 1.07. They showed that the number of computers (M=3.17, SD= 1.22) moderately influenced integration of ICT in instructions in public secondary schools in Habaswein Sub- County, power supply (M=3.61, SD= 1.03) had considerable impact on integration of ICT in instructions in Habaswein Sub-county. Additionally, It was indicated that access to computers by teachers had high influence on the integration of ICT in instructions in the region (M=3.49, SD= 1.18) while cost of software and hardware highly affected integration of ICT in instructions (M=3.61, SD= 1.11) and

Internet connectivity impact on ICT integration in instructions was high (M=3.55, SD= 0.87) [27].

The researcher tested the second hypothesis for the correlation between availability of ICT facilities and ICT integration in instructions in secondary schools in Habaswein sub-county.

Pearson's correlation analysis at 0.05 level of significance was carried out based-on hypothesis 1

H_{01}: ICT Resource availability affects ICT integration in instructions in government secondary schools in Habaswein Sub-county.

The Table 3 above shows the results of the analysis of the data obtained.

Based on the results on Table 3, upon using the Pearson correlation analysis at 0.05 significance level, availability of ICT facilities had a low but significant association (r = 0.644, p =.000) with integration of ICT in instructions in Habaswein Sub-county. P-values (p <0.01) for the association was below or less than 0.05 (that is p-value < 0.05), which means that there was a significant association between availability of ICT facilities and the integration of ICT in instructions

in public secondary schools in Habaswein sub-county. The outcomes in Table 3 illustrate that r[0.05, 61]= 0.646 was higher than critical-r = 1.67, this resulted in rejection of hypothesis three that; there are adequate ICT facilities for integration of ICT in instructions in public secondary schools in Habaswein Sub-county [28].

Variable 1 (availability of ICT resources) was to assess the influence of availability of ICT resources on integration of ICT in instructions in Habaswein Sub-county. On the interview schedule, the respondents who were deputy principals were required to clarify whether or not the availability of ICT resources affected the integration of ICT in instructions in government secondary schools in the region. Respondent 3 said "Availability of ICT resources is a key determinant of the level of their integration in instructions but, their availability does not fully guarantee integration as there are other factors that determine the use of these facilities." Respondent 7 had similar view saying that "Availability determines the level of use of ICT resources in teaching however, in some cases, the resources might be available but not used." Respondent 2 was categorical saying that "We have the resources but have not been used in instructions for some time due to other challenges such lack of stable power sources and poor Internet connectivity."

On the same question, Respondent 8 said "Some schools have ICT resources including desktops, projectors, and even a laptop but, this does not guarantee the use of the resources since most of the teachers lack skills." Such opinion was also presented by respondent 5 who said "Availability of ICT facilities might influence integration in instructions but this relationship might be different in some areas especially where instructors encounter other hindrances such as lack of stable power sources and Internet connection." Respondent 1 said "In my school there some ICT resources rarely the teachers use them, some say the resources are not adequate while others lack the required skills."

The results from the interview schedule also reflected similar issues. The first factor on this variable sought to establish whether or not availability of ICT support staff influenced ICT integration in instructions. Respondent 4 said "The school does not have a technician to help teachers with the computer hardware. most of them decide to carry on their teaching without ICT even when such resources are available." Respondent 1 said "Our teachers require some training on how to set up the facilities or connect them in classroom. when they lack someone to help them, most of them opt not to integrate ICT in instructions."

The second factor was set to assess the impact of cost on ICT integration in instructions. Respondent 4 said "ICT resources are costly including staff training on computer maintenance…this has made some schools overlook integration of ICT in instructions." On the same point, Respondent 7 said "Some of our ICT gadgets are out of service but the school does not have money to hire experts for their repair we rely on a few facilities to carry out unavoidable administrative tasks, hence, teachers rarely use them in instructions." Similarly, Respondent 5 said "The little resources we have cannot meet the cost of maintaining our ICT facilities thus most of the resources remain out of service making it difficult for teachers to deploy them instructions [29].

5. CONCLUSIONS AND RECOMMENDA-TIONS

5.1 Conclusions

In the contemporary environment, ICT plays a significant role in enhancing all areas of life including education. Based on the results of this study, it can be concluded that, an interplay of various factors has dragged effective integration of ICT in instructions in government high schools in Habaswein Sub-county, Wajir County. Such factors include unavailability and unsuitable ICT infrastructure in the schools, lack of adequate ICT skills among teachers characterized by lack of in-service training, restrictive administrative support including low budgetary allocation and lack of clear ICT policies to guide implementation. In this regard, there is low integration of ICT in instructions in government secondary schools in Habaswein Sub-county, Wajir County.

5.2 Recommendations

Based on the outcomes of this study, a number of recommendations are made:

The government should invest substantially to offer sufficient number of computers in secondary schools and improve Internet connection in the schools to foster easy access

and use of ICT resources. The government should diversify electrification in the rural areas to enable use of computers. However, in areas where it might be expensive to install electricity, the government can offer alternative sources and reliable power backup systems to minimize power interruptions. Equally important, the government should provide computers for schools or open avenues for schools to procure such resources at affordable cost. Finally, the government should release adequate finance for ICT programs for schools.

5.3 Suggestions for Further Research

i. This study was conducted in one sub-county only in Wajir County; similar research should be done on other sub-counties.
ii. Further study should be conducted involving private secondary schools to establish their level of ICT integration in instructions and factors that influence the process.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Kim S, Raza M, Seidman E. Improving 21st century teaching skills: The key to effective 21st century learners. Research in Comparative and International Education. 2019;14(1):99-117. Available:https://doi.org/10.1177/17454999 19829214.
2. Githinji GD, Ongeti K, Wanyonyi D. Analysing ICT resources available for integration in teaching and learning Kiswahili fasihi simulizi in public secondary schools in Kenya. Journal of Pedagogy and Curriculum. 2022;1(1):14-31. Available:https://doi.org/10.51317/jpc.v1i1. 270
3. Josh RK, Guru PP. Role of ICTs in promoting learner independence and motivation in English language classes Interdisciplinary Research in Education. 2019;4(1):67-76. Available:www.jurn.org
4. Murugesan V. ICT in 21st century Teaching and Learning; 2021. Available:https://www.researchgate.net/pu blication/349713146_ICT_in_21st_century _Teaching_and_Learning

5. Taole MJ. ICT integration in a multigrade context: Exploring primary school teachers experiences. Research in Social Sciences and Technology. 2024;9(1):232-252. DOI: 10.46303/ressat.2024.13
6. Murithi J, Yoo J. Teachers' use of ICT in implementing the competencybased curriculum in Kenyan public primary schools. Innovation and Education. 2021;3(5).
7. Hennessy S, Angondi E, Onguko B, Harrison D, Naseem A, Wamkote L. Developing the use of Information and Communication Technology to enhance teaching and learning in East Africa Schools: A review of the literature. 2010;1(1):1-16. Available:https://doi.org/10.1186/s42862-021-00012-0.
8. Mesra R, Tagaku A, Simbar T, Wangkanusa S, Mangar S, Podung O, Andal A. Basic Teaching Skills for Teachers at SD GP Kumelembuai. Journal Pajar (Pendidikan dan Pengajaran). 2023;7(5):1120. DOI: 10.33578/pjr.v7i5.9641
9. Gardner S. The role of science, technology, and innovation in driving Africa's economic growth, Rabat, Morocco:Africa Economic Symposium; 2021.
10. Ochieng BO, Miima FA. Teachers' perception about integration of ict tools in kiswahili language pedagogy in Homabay county, Kenya. International Journal of Arts and Commerce; 2019.
11. Karunakaran S, Dhanawardana R. Integration of ICT in the teaching-learning process: Challenges and issues faced by social science teachers. European Journal of Education and Pedagogy. 2023;4(4):24–30. Available:https://doi.org/10.24018/ejedu.20 23.4.4.696
12. Payal, Kanvaria VK. Learning with ICT: Use and barriers from teachers' perceptions. International Journal of Recent Scientific Research. 2018;9(1):23545-23548. DOI: http://dx.doi.org/10.24327/ijrsr.2018.0901.1 489.
13. Philemon A. ICT infrastructure, ICT competencies, and teachers' workload: Critical factors that influence social studies teachers' integration of technology in the Kwahu west municipality of ghana.

Journal of Education and Practice. 2020;11(14):65-75.

14. Gathano C. An investigation of factors influencing the use of ICT in technology and learning in secondary schools in Thika District (unpublished master`s thesis).University of Nairobi, Nairobi; 2009.

15. Waiti M. Determinants of the integration of ICT in public secondary school curriculum in Kakamega North District: (Unpublished master`s thesis). University of Nairobi; 2010.

16. Suhendi A. Constructivist learning theory: The contribution to foreign language learning and teaching. KnE Social Sciences. 2018;87-95.

17. Clark KR. Learning theories: Constructivism. Radiologic Technology. 2018;90(2):180-182.

18. Ahmad S, Sultana N, Jamil S. Behaviorism vs constructivism: A paradigm shift from traditional to alternative assessment techniques. Journal of Applied Linguistics and Language Research. 2020;7(2):19-33.

19. Plomp T, Anderson RE, Law N, Quale A. (Eds.). Cross-national information and communication technology: Policies and practices in educa tion. Charlotte, N.C.: Information Age Publishing; 2009.

20. Cuban L. Computer meet Classroom: Classroom Wins. Teachers College Records; 1993.

21. Kothari C. Quantitative techniques: 2ndEdition New Delhi: Hindustan Printers; 2004.

22. Mugenda MO, Mugenda AG. Research methods: Quantitative and Qualitative approaches. Nairobi: Acts press; 1999.

23. Andrade C. The inconvenient truth about convenience and purposive samples. Indian Journal of Psychological Medicine. 2021;43(1):86-88.

24. Gay LR, Airasian P. Educational research: Competencies for analysis and application. 6th edition. New Jersey: Prentice Hall; 2000.

25. Evans C, Lewis J. Analysing semi-structured interviews using thematic analysis: Exploring voluntary civic participation among adults; 2018.

26. Lindgren BM, Lundman B, Graneheim UH. Abstraction and interpretation during the qualitative content analysis process. International Journal of Nursing Studies. 2020;108:103632.

27. Booi SL, Chigona W, Maliwichi P, Kunene K. The influence of telecentres; 2019.

28. Ministry of Education. Sessional Paper No.1 of 2005 on a policy frame work for education training and research: meeting the challenges of education and training to all Kenyans, Nairobi: Government Printer; 2005.

29. OECD. Are students ready for a technology rich world? What PISA Studies tells us," France: OECD; 2004. Available:http://www.oecd.org/dataoecd/28/4/35995145/pdf

---

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle5.com/review-history/116653