USE OF INFORMATION COMMUNICATION AND TECHNOLOGY AND ITS INFLUENCE ON PERFORMANCE IN LANDFORMING PROCESSES AMONG SECONDARY SCHOOLS IN LAMU COUNTY, KENYA

Wainaina N Lucy[1], PROF Samson Ondigi[2], DR Hamisi Babusa[3]

Department of Education Communication and Technology Kenyatta University.
P.O Box, 43844, 00100, Nairobi, Kenya

Abstract: Research shows that ICT can promote quality education by fostering a learner-centered environment, quality teaching-learning processes, and strategies, effectual, creative, motivated, collaborative, interdisciplinary, evaluative, and self-directed learning as well as the enrichment of basic skills. This study probed the use of ICT in teaching and learning land forming processes among secondary schools. The two major objectives of the study were: first, to establish types of ICT resources used in teaching and learning land forming processes, second, to establish factors influencing the choice of ICT used in teaching and learning land forming processes The study employed the Roger's (2003) theory of Diffusion of Innovation. The study sought to investigate whether the form two geography teachers and students use ICT when teaching and learning land forming processes. The study involved a sample size of 121 students, 9 teachers, 6 HODs, and 6 Principals. Data collection instruments included students' and teachers' questionnaires, a teaching observation checklist, and HODs' and Principals' semi-structured interviews. Data collected was both quantitative and qualitative. The quantitative data was analyzed by way of both descriptive and inferential statistics using SPSS software. The study concludes that while most schools have ICT tools that they can use for teaching and learning, most teachers in those schools are not fully utilizing these tools due to a number of factors including lack of a culture of using ICT tools and expertise. Accordingly, the study recommends that schools should work out ways of encouraging the development of an ICT culture.

1. INTRODUCTION

Quality education as being a fundamental need for every individual across the globe and it involves learners' access to adequate resources and facilities, relevant curricula, and materials that make it possible for the learners' to acquire basic numeracy and literal skills for positive participation in the society. It includes the use of learner-centered instructional methods that promote learning and minimize disparities (UNICEF, 2000). In modern society, Information Communication Technology used into the Geography curriculum and its associated lesson delivery methods are vital to producing ICT literate and competitive learners who can function effectively in various spheres and workplaces in the 21st century. Studies show that information and communication technology (ICT) can promote quality education by fostering a learner-centered environment, quality teaching-learning processes and strategies, effectual, creative, motivated, collaborative, interdisciplinary, evaluative, and self-directed learning as well as the enrichment of basic skills (Saravanakumar, 2018; Kapur, 2019; Amutha, 2020). The Kenyan government together with the Ministry of Education established the Kenya National ICT policy in January 2006 aiming at enhancing the availability of accessible, efficient, and reliable ICT services showing its great commitment to the importance of effective utilization of ICT in the Education Sector (ICT Policy, 2006). Through the policy, the government advocates for the use of ICT as a tool for improving the quality of teaching and learning in schools. the use of ICT in teaching Geography and especially on land forming processes, which can benefit a lot from the subtlety of the technology more so from the informative, motivating, and interesting visual graphics, are not any different from what is evident in Lamu County. Lamu is one of the most marginalized counties in Kenya generally characterized by minimal development in ICT infrastructure and limited utilization even of the few ICT tools that are available in teaching and learning (ICT Authority, 2015). It includes its limited use even in Geography lessons such as land forming processes. As such, this study sought to investigate the dynamics that influence the low use of ICT in teaching and learning of land forming processes in Geography among secondary schools in Lamu County.

2. STATEMENT OF THE PROBLEM

ICT is the engine for economic and technological development in the 21st century. It is also a great deal of Kenyan secondary school curriculum instruction as we ICT in the recent past has become the driving force in the education sector, beginning from the ministry, administration and also in teaching and learning that take place in classrooms. ICT help in monitoring both teachers and learners in their performance. In the classroom, it helps the teachers and the learners to access large amount of information. Digital library enables the users to store and retrieve information hence making learning experiential and experimental.

However, the effectiveness of the use of ICT may be hindered by lack of cooperation between the teachers, students and administration. If the teachers fail to monitor the students when using internet they may go to social pages like face book instead of learning. When the teacher is face booking and chatting during lesson the students end up losing focus and ignore the objectives of the lesson. Inadequate ICT facilities also will hinder effective use of ICT during lesson. ICT is sometimes misused when the teacher gives the students assignment to research instead of teaching them.
Therefore, the study sought to investigate whether the geography teachers in Lamu west constituency effectively integrate ICT when teaching land forming processes. The study sought to investigate factors influencing the choice of the ICT tools and the challenges experience in using ICT when teaching land forming processes.

3. OBJECTVES

The objective of the study was to investigate the types of ICT tools used in teaching and learning geography, in secondary schools in lamu county, Kenya.

4. LITERATURE REVIEW

There are different types of ICT tools employed in the teaching and learning process, including teaching land-forming processes. Primarily, the ones found to be very relevant and beneficial in teaching physical geographical features include the Computer, Internet, and YouTube (Brunn, Cutter, & Harrington, 2004; Houfsonen, Kan, Kaanrinta, & Rehunen 2004; Erdem 2008; Okarbiniski, 2010; Al-Enezi 2013; Cemalettin, 2015).

Research shows that computer usage has been advancing from learning computer packages to teaching and learning through the computer (Volmsn, 2005). Mikre (2012) in his study shows that teachers with ICT skills, specifically those able to use a computer have a positive attitude towards the use of ICT tools in the teaching and learning process. The study found that Tanzanians embrace the integration of computers in the education sector, especially in institutions of higher learning. Hare (2007) conducted a study conducted in Ethiopia and found that the computer and Internet are widely used as instructional tools in secondary schools and institutions of higher learning. The use of computers and the internet enable the teachers and the learners to have wide access to up-to-date information (Hare, 2007). Mikre (2011) explains that computers in Ethiopia are used in educational institutions, offices, and at home.

Internet enables people to access a lot of information faster, easily, safely, and with minimal cost (Yuzer 2006). The Internet has enabled scholars, researchers, and other people to access information for all disciplines. It provides up-to-date information. There is a global increase in usage of the internet because people have learned the importance of the internet (Bevainis 2008). Internet is used at homes, schools, working places, cyber cafes, and in many more places.

Tulk (2008) researching in Turkey found that the internet is mainly used by people between the ages of 16-74 years. Another research pointed that the highest percentage of internet usage was found in educational institutions, for learning and research (Tokcan 2009). Geography teachers use the internet to access content on land forming processes, videos showing volcanicity, folding, and faulting process. Such information helps the teacher in teaching and learning processes (Erdem 2008). Teachers use the internet to access scientific information on teaching strategies, teaching methods, and teaching techniques. Cemalettin (2015) study generally focused on how teachers use the internet but did not focus on how Geography teachers apply the scientific information accessed in teaching land forming processes. In some schools, the lack of strong internet connectivity hinders teachers from accessing the required information (Demirci 2008).

5. THEORETICAL FRAME WORK

The study was based on Roger's (2003) theory of Diffusion of Innovations. The theory that seeks to explain how, why, and at what rate new ideas and technology spread through cultures. The original diffusion research was done as early as 1903 by the French sociologist Gabriel Tarde. Diffusion research centers on the conditions which increase or decrease the likelihood that a new idea, product, or practice is adopted by members of a given culture or a social system.

This was extended by Rogers (2003) hence at present is commonly known as Roger's theory of diffusion of innovation. Innovation diffusion research has attempted to explain the variables that influence how and why users adopt a new information medium, such as the Internet. The diffusion of information technology and telecommunications hardware, software, and services turns out to be a powerful driver of growth, having an impact on worker productivity (Bollou, 2002). Robinson 2009 observes that, instead of focusing on persuading individuals to change, the theory sees change as being primarily about the evolution or "reinvention" of products and behaviors so they become better fits for the needs of individuals and groups. Each member of the social system faces his/her own innovation-decision that follows a 5-step process; Knowledge; person becomes aware of an innovation and has some idea of how it functions, Persuasion; person forms a favorable or unfavorable attitude toward the innovation, Decision; person engages in activities that lead to a choice to adopt or reject the innovation, Implementation; person puts an innovation into use, Confirmation; person evaluates the results of an innovation- decision already made (Sahin, 2006). This compels the user to continue adoption or later reject the technology. The use of or rejection of innovations is characterized by; the relative advantage, compatibility, simplicity, trial-ability and observe-ability. So understanding and utilizing diffusion networks can aid strategy aimed at quickly inducing system-wide change (Robinson, 2009). Given that education stakeholders are aware of the ICT innovations across the world, there is still poor implementation of ICT in secondary schools. Rogers' diffusion of innovations theory is the most appropriate for investigating the application of ICT teaching in secondary schools in Kenya.

6. METHODOLOGY

Research design

This study employed a descriptive survey research design. According to Mathooko (2011) descriptive research includes surveys and fact finding enquiries and is applied where the study is using comparative variables in the field of study and the case at hand has no control over the variables and the researcher can only report on what has happened or what is happening. Descriptive survey research design was chosen because it enabled the findings to be generalized to a larger population. The study used both qualitative and quantitative data. Qualitative data was collected through interviews that were conducted and from the observation checklist. Quantitative data was collected through questionnaire.

Target Population

The target population for this study was Lamu west which has a total of 20 secondary schools. Among the 20 schools in Lamu west, three of them are private schools. The study only focused on public schools and excluded the private schools. This is because private schools are endowed with adequate resources. The study focused on the form 2 classes in the targeted schools because internal land forming processes as a topic is taught in form two. The target population of this study is 15 secondary schools which were found to have ICT tools and are accessible. The total number of form 2 geography teachers was 24 and the form two geography students are 1821. The number of heads of departments in all the targeted schools is 15. Therefore, the total target population is one thousand eight hundred and sixty (1860).

7. SAMPLING TECHNIQUE AND SAMPLE SIZE

i) Sampling technique: Both probability and non-probability procedures were used to select the sample, to ensure that all observations will be given equal chances of selection. The study picked form two because land forming processes is taught at form 2.

Purposive sampling was used to select Lamu west constituency because it has more schools with ICT resources as compared to lamu East. Stratified sampling was used to come up with three strata which include national, extra county and county schools. Random sampling was used to select one national school out of the two, and the other one was used for pilot study. Purposive sampling was used to select one an extra-schools since it is the only one in Lamu west. Random sampling was used to select 4 county schools out of 14 county schools in Lamu West. The 6 schools were randomly selected out of the total of 17 schools, gives 35%. For the schools with more than one stream, the researcher

used random sampling to select the participants giving an enrolment of 810 form 2 students and 16 form two geography teachers and the 6 heads of department. The form two (2) geography students and form 2 geography teachers who participated in the research process were selected through simple random sampling. The heads of department (HOD) of the selected schools was used in the study.

ii) Sample size: A sample of about 25% of the sample was found suitable for this study.

TABLE 1: Table showing sample size of the study in Lamu County, Kenya

NO	SCHOOL	STUDENTS	SAMPLE	TEACHERS	SAMPLE	PRNCPALS	TOTAL
1	A	157	27	2	2	1	30
2	B	35	9	1	1	1	11
3	C	125	31	2	2	1	34
4	D	55	14	1	1	1	16
5	E	98	25	2	2	1	2
6	F	50	15	1	1	1	17
TOTAL		470	121	9		6	136

Source: Ministry of Education, Lamu West Report 2022

8. RESEARCH INSTRUMENTS

The study developed 3 instruments that were used in data collection process. The three instruments included: the questionnaires, the interview and the check list. The questionnaires were administered to form two geography students and form two geography teachers. The interviews were conducted to the HODs and the principals' of the selected schools. The observation checklist and the documentary were filled by the researcher. Qualitative data was categorized and assigned codes based on the research objectives and questionnaires. Quantitative data was summarized for computer analysis with statistical package for social sciences (SPSS) version 21.0.

a) **Questionnaire**: The study used questionnaire containing both open and close-ended questions so as to be able to capture more information from the respondents. Two questionnaires were used for the study, one for the form 2 geography teachers (see appendices B) and another one for the form 2 geography students (See appendix C). Each questionnaire has 3 sections which include: section A, biographical data, Section B, types of ICT tools used and the extent of usage. Section C, challenges and the possible solutions to the challenges experienced.

b) Interview: Interview was preferred because it helps the researcher to gain in depth information, seek clarification and know when the respondents are cheating. Interview was highly preferred because it allows multisensory channels and is also a flexible tool of collecting data.
The study developed interview guide (Appendix 4), which had only 3 questions. The interview was done to the principals who were purposively selected. The interview went hand in hand with the audio recording especially to the principals who allowed the recording.

c) Observation schedule: The study used observation schedule (See Appendix 5), which was filled by the researcher through observation. The observation checklist contained 2 sections: section one focused on observation that the researcher made in the classroom, section two focused on observations that were done in the computer laboratory by the researcher. Observation schedule provided information mainly focusing on; availability, accessibility and workability of the ICT tools in the selected schools. It provided information that may not be clearly collected through questionnaires and interview.

9. Data analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 28.0. Data obtained from the questionnaires was first edited, cleaned and categorized into common themes to represent meaningful data. Quantitative data was pre-coded from the questionnaire which was coded and then entered in a computer. The researcher then used the computer in order to run descriptive analysis. The data was then analyzed using descriptive statistics such as mean and standard deviation, frequencies and percentages. Qualitative data from the interviews and observation checklist was analyzed and presented in tables, figures, graphs and charts.

10. RESEARCH FINDINGS

The objective of the study sought to investigate the types of ICT tools used by geography teachers when teaching land forming processes. The first issue that the study sought to establish is the issue of the ICT tools available in the sampled schools – those which are used in teaching and learning of Geography, and in particular, land forming processes. The study focused on four major ICT tools which include: computer, laptops, internet and projector

i) Computer

One of the ICT tools whose availability the researcher sought to establish is the computer (s). This was sought through two documents, thus; document analysis schedule and an observation checklist. The findings from these two instruments were corroborated to establish the true situation on the ground. The researcher established that all the six schools visited had some computers. But despite having these computers some were observably inaccessible to the students for use. And in general, the few available computers/laptops in the visited schools were observed to be inadequate. These findings are summarized in the table below.

TABLE 2: Table showing availability and accessibility of computers in sampled schools

School	Computer Availability		Computer Accessibility		Comment
	YES	NO	YES	NO	
County	4 (66.67%)	0	3 (50%)	1 (16.67%)	Inadequate
Extra County	1(16.67%)	0	0	1(16.67%)	Inadequate
National	1(16.67%)	0	1(16.67%)	0	Inadequate
	6		6		

Table: Computer availability and accessibility

ii) Laptop

The other ICT tool that the study focused on is the laptop(s). All the sampled schools had laptops, where most of them were owned by individual teachers, while others were in computer labs. The laptops available to the students were limited since the once owned by staffs were personal and rarely available to the students, except upon special request. The table below shows the availability and accessibility of laptops.

TABLE 3:Table showing availability and accessibility of laptops in sampled school.

School	Laptop Availability		Laptop Accessibility		Comment
	YES	NO	YES	NO	

County	3 (50%)	1(16.67%)	3 (50%)	1(16.67%)	Inadequate and inaccessible (meant for teachers)
Extra County	1(16.67%)	0	0	1(16.67%)	Inadequate and inaccessible
National	1(16.67%)	0	0	1(16.67%)	Inadequate
	6		6		

Table: Laptop availability and accessibility

iii) Internet

The third ICT tool that the research focused on is the internet. The researcher sought to establish the availability of the internet and its connectivity in the sampled schools. The internet help both teachers and learners to access large amount of content including the latest information on land forming processes. The following table shows the findings on this aspect.

TABLE 4: Table showing availability and accessibility of internet in sampled school.

School	**Internet Availability**		**Internet Accessibility**		**Comment**
	YES	**NO**	**YES**	**NO**	
County	3 (50%)	1(16.67%)	2 (33.3%)	2 (33.3%)	Inadequate
Extra County	1(16.67%)	0	0	1(16.67%)	Inadequate
National	1(16.67%)	0	0	1(16.67%)	Inadequate
	6		6		

Table: Internet availability and accessibility

iv) Projector

The last tool that the researcher focused on is the projector. Projector is a convenient tool because just one is enough to serve a whole class. In case of inadequate laptops and computers, the teacher uses the projector. The following table therefore shows the findings on the aspect of availability and accessibility of a projector in the sampled schools.

TABLE 5: Table showing availability and accessibility of projectors in sampled school.

School	**Projector Availability**	**Projector Accessibility**	**Comment**

	YES	NO	YES	NO	
County	3 (50%)	1(16.67%)	2 (33.3%)	2 (33.3%)	Inadequate
Extra County	1(16.67%)	0	0	1(16.67%)	Inadequate
National	1(16.67%)	0	0	1(16.67%)	Inadequate
	6		6		

Table 5: Projector availability and accessibility

11. CONCLUSION AND RECOMMENDATIONS

Conclusion

The Findings indicated that the main ICT tools available in the sampled schools were computers (desktops) and laptops, internet and some projectors. It was noted that many of the sampled schools did not seem to have enough ICT tools that would be used for teaching and learning. And the few that were available were either broken down, were in short supply or teachers had not developed a habit of using them. The researcher concluded that the schools in the sample do not seem to have invested enough in ICT tools as most of them only had a few ICT tools. But even those that had some ICT tools that can be used for teaching and learning, these tools were inadequate and in some cases, inaccessible by students.

Recommendations

i) As a matter of policy, the ministry of education should develop guidelines that would guide and support schools to have ICT tools and to put them into use, which use includes serving the student population and not just teachers alone.

ii) Schools must make a conscious effort to invest in ICT tools in their respective schools and also maintain these tools whenever they are broken down or are out of use. This includes encouraging these schools to have some facilities such as computer labs which can serve a wider population including the students.

iii) Education authorities must work towards having some sensitization forums for school managers on the importance of integration of ICT tools in their teaching and learning so as to tap on such stakeholders support in having such tools in schools and in use.

REFERENCES

Amuko, S., Miheso, M., & Ndeuthi, S. (2015). Opportunities and Challenges: integration of ICT in Teaching and Learning Mathematics in Secondary Schools, Nairobi, Kenya. Journal of Education and Practice, 6(24), 1-6.

Amutha, D. (2020). The Role and Impact of ICT in Improving the Quality of Education. Available at SSRN 3585228

Cemalettin, A. Y. A. S. (2015). The Role of media in geography courses from the perspectives of pre-service social studies teachers. Journal of Social Studies Education Research, 6(1), 172-189.
Mikre, F. (2011). The roles of information communication technologies in education: Review article with emphasis to the computer and internet. Ethiopian Journal of Education and Sciences, 6(2), 109-126.

Mirzajani, H., Mahmud, R., Fauzi Mohd Ayub, A., & Wong, S. L. (2016). Teachers' acceptance of ICT and its integraton in the classroom. Quality Assurance in Education, 24(1), 26-40.

Olokoba, A.A., Abdullahi, A.M. & Omosidi, S.A (2014). Impact of information and communication technology (ICT) on the management and performance of secondary school teachers in Kwara State, Nigeria. International Journal of Education Learning and Development 2(3), 60-67

Omariba, A., Ondigi, S. R., & Ayot, H. O. (2016). Challenges Facing Teachers in Integrating Educational Technology into Kiswahili Teaching. A Case of Selected Secondary Schools in Kisii County, Kenya. International Journal for Innovation Education and Research, 4(12), 23-39.

Rogers, E.M. (2003). Diffusion of innovations. New York: Free Press.

Sara vana kumar, A. R. (2018). Role of ICT on Enhancing Quality of Education. International Journal of Innovative Science and Research Technology, 3(12), 717-719

UNESCO (2000). World Education Forum: the Dakar framework for action, education for all; meeting our collective commitments. Paris: UNESCO

UNESCO. (2007). The UNESCO ICT in Education Programme. UNESCO Bangkok.