EFFECTIVENESS OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN STUDY CENTERS IN DAR-ES SALAAM EAST AFRICA

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Abstract - Information and Communication Technologies (ICT) have redefined the educational frameworks by providing new opportunities and innovative effective environments of teaching and learning and with the emergence of IT-based educational innovations that offer potential learners an alternative and innovative learning environment, this study examined effectiveness of Information Communication Technologies (ICT) in study centers in Dar es Salaam East Africa, guided and answered three research questions. A descriptive correlation research design was deemed best for the study and simple random sampling was used to select three study centers from ilala Municipality Dar-es salaam. A sample of 123 respondents was selected via simple random sampling technique. A self administered questionnaire designed on a 4-1 likert scale was used to collect data. Descriptive statistical tools such as mean and standard deviation were used to analyze the data obtained from the respondents. The results obtained showed that ICTs were not fully utilized in the teaching and learning process effectively. Based on the findings, the researcher recommended training of teachers on the use of ICT towards ensuring the effectiveness of the teaching and learning process, the government to embark on the proper implementation of ICT policy strategic plan and having affordable rates of ICT tools like laptops to teachers and students.

Index Terms - Adoption, Effectiveness, E-Learning, Teaching, Utilization.

I. INTRODUCTION

Information and Communication Technology (ICT) usage in learning institutions can be categorized as a combination of technologies for collecting, storing, processing, communicating and delivery of information related to teaching and learning processes (Njoku (2006). on the other hand ICT adoption in the education sector can be viewed as a broad term that involves the harnessing of the process, the methods, and the products of electronic and communication-related technologies for enhancing the teaching and learning (Onuma, 2007).

The effective implementation of ICT depends upon users' having positive attitudes towards it. This shows that actual use of ICT depends largely on teachers' personal feelings, skills, and attitudes towards ICT. This implies that teachers who have positive attitudes towards ICT and perceive it to be useful in promoting learning will evidently integrate ICT in their classroom more easily than others. Whatever new technologies introduced into the educational system cannot be done effectively without carrying the teachers along. Teachers are at the heart of any successful innovation in schools without their collaboration, nothing worthwhile can be achieved. However, in many schools, teachers are not skilled enough to make use of ICT in instruction. Their initial training, which quite often the only one they have received, generally does not include the use of contemporary technologies for teaching. At the same time, most teachers are reluctant to invest their own time and resources in developing themselves in the area of information technology. Some of the teachers are not even convinced of the necessity of ICT as a tool in instruction delivery (Yusuf, 2005).

Even though limited ICT adoption and Utilization of study centers in Tanzania may be pointed at the limited investments in the sector by the Tanzanian government, increased investment does not guarantee effective usage as realized from the most developed countries. In the United Kingdom, the government spending on educational ICT in 2008–09 was £2.5bn (Nut, 2010), in United States, the expenditure on K-12 schools and higher education institutions was $6 billion and $4.7 billion respectively in 2009 (Nut, 2010) Despite all these investments on ICT infrastructure, equipments and professional development to improve education in many countries, Gülbahar (2007) claimed that huge educational investment have produced little evidence of ICT adoption and use in teaching and learning.

Several factors influencing the adoption and usage of ICT into teaching have been identified by researchers. Rogers (2003) identified five technological characteristics or attributes that influence the decision to adopt an innovation. These are; user characteristics, content characteristics, technological considerations, and organizational capacity as factors influencing ICT adoption and integration into teaching.

Mselle (2012) outlines some obstacles which need to be addressed in order to initiate a meaningful move towards the use of ICT in teaching in Tanzania. These obstacles include inadequate national ICT and electricity infrastructure especially in the rural areas. The telecommunication network is limited to the main cities and internet access costs are still high; making it difficult for schools to access and afford. However, the ministry of education and vocational training in

Tanzania (MoEVT) has limited capacity to integrate and use ICT effectively. These capacity constraints include lack of coordination of ICT activities, limited information sharing, limited skills for integration of ICT; lack of scheme of services for ICT trained personnel and ineffective organizational structures (Ibid).

It is further stated that the use of ICT requires adjustments to more learner-centered and interactive teaching methods, thus redefining the role of the teacher as a facilitator. It is over a decade now since the introduction of ICT policy; yet it seems that what is stated (on the paper in fact) has not been achieved since the level of competence of teachers on the use of ICT as a pedagogical tool has been criticized by many scholars. In this regards, it makes sense to state that the use of ICT as a pedagogical tool in Tanzania is not a common practice in many study centers.

1.1 Statement of the Problem

Since 1980 to date, the Tanzanian government has endeavored to ensure that there is growth and development of ICT in the education sector. In 1980 it started with the Science and technological sector in education, which it followed up with the Tanzanian Commission for science and technology (COSTECH) six years later. In 1990 the Ministry of Science, Technology and Higher Education (MSTHE) was started. There was also the development of the ICT national policy that covers all sectors including the education sector (Kafyulilo, 2010). Inspite of all these efforts to stimulate growth of ICT in the education sector, there is still insufficient infrastructure in place. With less than 2% of the country's population connected to the national power grid and less than 1% of the country covered by physical data lines little can be achieved on the front (Mselle, 2012).

According to Kambagha (2008), majority of the teachers in most secondary schools in Dar-es-salaam are aware of ICT facilities, but are not utilizing them because knowledge and the extent of competence in using ICT facilities in the teaching and learning process is insignificant. Those few discovered to have adopted and utilized ICT are reported to commonly utilize it in; preparation for notes, teaching learning resources and examinations. Such levels of ICT utilization cannot enable teachers to radically change their pedagogical practices and beliefs. Although there are no official estimates on the use of ICT in teaching in Tanzania, the limited ICT infrastructure in place points to poor utilization and adoption. A very small number of secondary schools have ICT facilities and the government initiative to provide them for schools seems to be very minimal. It is said that, those schools with ICT facilities have either benefited from parents' contributions or donations from non-governmental organizations and some private sector companies. For instance, out of 4,367 secondary schools in Tanzania, only 887 schools have computers. Out of 10189 available computers, only 9070 (89%) are functional of which 5817 (64.1%) are used for training purpose (URT, 2011).Nevertheless the researcher deems it necessary to probe the effectiveness of ICT'S in study centers in Dar es salaam in East Africa so that the findings can guide the government strategy in improving education.

1.2 Purpose of the Study

The purpose of the study was to investigate the effectiveness of information and communication technologies in study centers in Dar-es salaam East Africa.

1.3 Specific Objectives

a) To determine the level of awareness of modern ICT facilities utilized in Teaching and learning in study centers in Dar-es salaam East Africa.
b) To examine the level of ICT adoption and Utilization in study centers in Dar-es salaam East Africa.
c) To examine the relationship of ICT adoption and Utilization effectiveness towards the teaching and learning process of study centers in Dar-es salaam East Africa.

1.4 Research Questions

a) What is the level of awareness of the modern ICT facilities utilized in teaching and learning in study centers in Dar-es salaam East Africa?
b) What is the level of ICT adoption and Utilization in study centers in Dar-es salaam East Africa?
c) How is ICT adoption and Utilization effective towards the teaching and learning process of study centers in Dar-es salaam East Africa?

1.5 Scope

The study was carried out in selected study centers in Ilala municipality. The content was reviewed under ICT adoption and utilization. The study was guided by the Constructivism theory and globalization theory. The study considered literature that dates ten years back to date. Data collection was undertaken in two months.

II. LITERATURE REVIEW

2.1 Theoretical review

2.1.1 Globalization theory

Globalization is a form of internationalization of some aspects of education such as sharing of educational materials and pedagogical techniques. Tools such as e-learning platforms, blogs, discussion forums, and chat rooms are quite familiar to most teachers and may be used to offer great potential for online collaboration among them (Godwin-Jones, 2003). These new ICT tools provide a channel through which teachers can

enrich their global awareness, which, in turn, strengthens teachers' design of effective learning environments (Smith & Doyle, 2002). As for effectiveness of ICT in teaching and learning, this theory can empower teachers beyond traditional teaching because technology provides adaptable and flexible teaching and learning.

2.1.2 CONSTRUCTIVISM THEORY

Constructivism theory represents a paradigm shift in the epistemology of knowledge and theory of learning. The increasingly prevalent literature-based approaches to reading and process approaches to writing both share constructivist roots (Thompson, McLaughlin, & Smith, 1995).

2.3 Review of Related Literature

2.3.1 Level of ICT adoption and Utilization

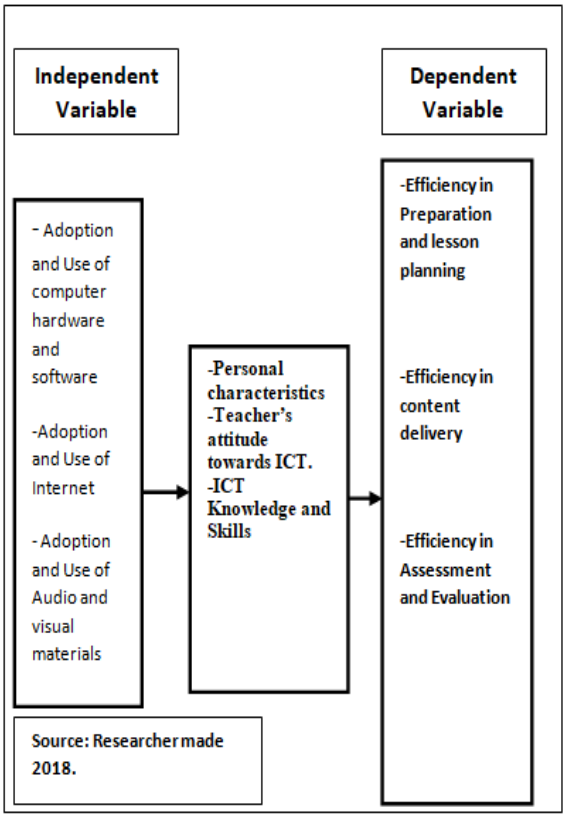
Berman and Mclaughlin (1978) conducted a four-year, two-phase study of U.S. federally funded programs designed to introduce and spread innovative practices in public schools. They analyzed the effects of federal policies, and examined factors affecting the implementation and continuation of the innovative policy: Educational methods-projects with essentially the same educational methods can be implemented very differently and with varying effectiveness, Project resources, Scope of project-teachers must clearly understand their project's goals and percepts, Implementation strategies; including local decisions and choices, School organizational climate; including the quality relationship among teachers, the active support of principals, and the effectiveness of project directors, Characteristics of schools and attributes of teacher, District management capacity and support; the constant and active support from local educational agencies and specialized staff were important to both short-run outcomes and long-run project fate.

2.3.2 Level of teaching Effectiveness

In a qualitative multiple case-study research on primary school competence and confidence level regarding the use of ICT in teaching practice conducted in five European countries, Peralta & Costa (2007) found that technical competence influenced Italian teacher's use of ICT in teaching. However, the teachers cited pedagogical and didactic competences as significant factors if effective and efficient educational interventions are likely to be implemented. In Portugal, teachers reported different views regarding the most important competences for teaching with ICT. The experienced and new teachers stressed the need for technical skills and attitude, the innovative teachers' emphasized curricula and didactic competences and the student-teachers cited technical competence and pedagogical efficiency as significant to integrate ICT in teaching and learning processes. According to Peralta & Costa (2007), teachers with more experience with computers have greater confidence in their ability to use them effectively. Research has been conducted on teacher's self-efficacy and reported to have greater effect on their use of ICT. According to Liaw, Huang and Chen (2007), teachers' computer self-efficacy influences their use of ICT in teaching and learning. Similarly, (Yuen & Ma, 2008) revealed that the Hong Kong teachers' implementation of ICT depended on simplicity of computer use and perceived teacher self-efficacy.

Knezek and Christensen (2002) revealed that teachers' competence with computer technology is a key factor of effective use of ICT in teaching. Peralta and Costa (2007) conducted a study on 20 teachers' competences and confidence regarding the use of ICT in classrooms. They revealed that in Italy, teachers' technical competence with technology is a factor of improving higher confidence in the use of ICT.

2.2 Conceptual Review



The conceptual framework above reflected a positive relationship between ICT utilization and adoption and effectiveness of teaching and learning in secondary schools. Under the Independent variable the constructs are; Use of computer hardware (use of Cameras, printers, PCs, Scanners, Fax machines), Use of Internet, Use of Audio visual (Television set, DVD players, Projector, PA system, Cassettes, Radio). Effectiveness of teaching and learning was attained when the intervening variables facilitated the connection. These are; Personal characteristics, Teacher's attitude and ICT competence. Under the dependent variable the constructs are, Efficiency in Preparation and lesson planning, Efficiency in content delivery, Efficiency in Assessment and Evaluation.

III. METHODOLOGY

3.1 Research design

The study employed descriptive correlation research design. This was used to obtain the views and perceptions of the respondents regarding Adoption & Utilization of ICT on the effectiveness of teaching learning process in study centers in Dar es salaam East Africa. Then correlation was used to determine the relationship between adoption and utilization of ICT.

3.2 Research Population

The research population constituted of selected study center teachers from X, Y and Z study centers who are 182 teachers all together (URT, 2014).

3.3 Sample Size

The sample size was selected by using krejcie and morgan sample size determination method. Given the population of 182, a sample size of 123 respondents was selected.

SCHOOLS	NUMBER OF TEACHERS	PERCENTAGE CONTRIBUTION (%)	SAMPLE SIZE SELECTED
X	78	43	53
Y	61	34	42
Z	43	23	28
TOTAL	**182**	**100%**	**123**

Source: Researcher made 2018.

3.4 Sampling Procedure

This study used both probabilistic and non-probabilistic sampling techniques.

Given that Ilala district has 47 secondary schools, simple random sampling was used to select 3 schools out of the 47 secondary schools, then strata's were formed according to the different subjects taught by the various teachers in the selected secondary schools to ensure that there was an equal representation . After stratified sampling then simple random sampling was again used to select the required sample from every representative group until the specified numbers were obtained.

3.5.1 Questionnaire

This study employed a self administered close-ended questionnaire. The specific objectives were analyzed from a set of fixed alternatives that the respondents chose.

IV. PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

Level of Education of the respondents Figure 4.1.2

The findings showed that 46% of the respondents represented in the study hold a bachelors' degree, followed by 40% who are diploma holders. 14% of the respondents have a masters' degree while they were no respondents with a PhD.

4.5. Respondents' Knowledge and Applicability of ICT tools in teaching and Learning.

To test the teachers' knowledge and applicability of ICT tools, the respondents were measured on a ranked scale ranging from Very Good to Poor. The table 4.5 that follows shows the findings of the study.

Table: 4.5

ICT Tools	Very Good	Good	Fair	Poor	TOTAL
Computer	19	27	36	41	123
Printer	18	14	26	65	123
Camera	8	14	41	60	123
Radio cassettes	20	29	40	34	123
Public Address System	45	55	10	13	123
Projector	10	23	17	73	123
Cable Television	5	16	38	64	123
Internet	12	8	37	66	123

Source: Researcher made 2018.

The findings in Table 4.5 represent the respondents' knowledge and applicability of a computer, 37% of the respondents were poor, followed by a 32%, 17% were good and only 14% were very good and thus, majority of the respondents do not have the required knowledge of using a computer in the teaching and learning

process. Being an ICT tool that most of the respondents can't use efficiently, then the effectiveness of teaching and learning through these ICT tools remain inadequate, secondly (53%) of the respondents' knowledge and applicability of printers was poor, 21 % being fair and the least being (11%), Whereas 15% of the respondents were very good. The findings therefore represent that majority of the teachers have less or no knowledge on the use of a printer into teaching and learning. And other findings show that (49%) of respondents were having the least knowledge and application of cameras in teaching and learning, followed by a 33% of respondents who are quite fair, 11% of respondents were good and only 7% of the respondents were better off on having knowledge on the above named ICT tool. Further the findings show majority of the respondents (49%) were having the least knowledge and application of Radio cassettes in teaching and learning, followed by a 33% of respondents who are quite fair, 11% of respondents were good and only 7% of the respondents were better off on having knowledge on the named ICT tool. (45%) of respondents are poor, 37% of the respondents were very good and thus, have the knowledge and application of public address system in teaching and learning, 8% of respondents were quite fair and lastly 10% of respondents have lesser knowledge on the applicability of public address systems.

The findings further revealed that 59% of the respondents were the majority and poor at applicability of projectors in the teaching and learning process, 14% were fairly challenged to its application and 19% were good and have at least adequate knowledge on its application. Only 8% of the respondents were reasonably good, 52% majority of the respondents are poor at applicability of Cable Television in the teaching and learning process, 31% were fairly challenged to its application, 13% are good and at least have adequate knowledge on its application whereas only 4% of the respondents were reasonably good, and lastly (54%) of respondents have lesser knowledge and applicability of the internet, whereas 30% of the respondents represented in the study are fair. 6% of the respondents represented in the study are somewhat good and only 11% of the respondents have excellent knowledge and applicability of the internet.

4.2 Level of Adoption and Utilization

To determine the level of ICT adoption and Utilization in selected secondary schools in Ilala Municipality, the respondents were subjected to statements testing the level of ICT adoption and Utilization. Therefore the findings are represented in the tables hereafter.

Table 4.2 Adoption of ICT

STATEMENTS	N	MEAN	STANDARD DEVIATION	T-DISTRIBUTION
I have access to a computer at school	123	3.61	0.88	4.10**
I have access to a printer at school	123	3.55	1.07	3.32**
I have access to a camera at school	123	2.41	0.61	3.95**
I have access to a projector at school	123	2.61	0.72	3.63**
I have access to a cable television set at school	123	3.2	0.97	3.30**
I have access to a public address system at school	123	2.43	0.58	4.18**
I have access to a DVD player at school	123	2.13	0.67	3.18**
I have access to the internet at school	123	2.52	0.74	3.41**
I have access to a Radio Cassette at school	123	3.43	1.02	3.36**
Valid N (listwise)	**123**	**2.802**	**0.793**	**3.53****

**** t distribution is significant at 0.01**
Source: Field Survey 2018

The findings in table 4.2 on the adoption of ICT in Ilala district shows that the level of ICT adoption in selected secondary schools of Ilala district is low with an average mean of 2.80 and a standard deviation of 0.793. The respondents disagreed with most of the statements they were subjected too, with the only agreements registered for having access; to a computer at school (3.61), printer at school (3.55), Radio cassette at school (3.43) and cable television set at school (3.2). The statement that had the least mean score of 2.13 was that the respondents did not have access to a DVD player at school. On the contrary the respondents disagreed that they had access to: a DVD at school, a camera, public address system, projector and Internet at school. All the statements registered were significant at a 99% level of confidence. Therefore the means scores are representative enough of the respondents view on ICT adoption.

Utilization of ICT

The findings revealed that the level of Utilization of ICT was very low with a mean score of 1.98 and very low standard deviation of 0.46. The only agreement was that the respondents sometimes print notes for reference at school; otherwise they strongly disagreed with most of the statements. They strongly disagreed

that they have often used public address systems to aid in teaching; previously used a DVD player, cable television, camera to aid in teaching. There was also disagreement that; the teachers often use computers, DVD, Radio cassettes and gather teaching materials at school. All the statements registered were significant at a 99% level of confidence. Therefore the means scores are representative enough of the respondents view on ICT adoption.

4.3 Effectiveness of Teaching and Learning

To determine the effectiveness of teaching and learning, the respondents were subjected to statements testing the effectiveness of teaching and learning. The findings show that the respondents are in agreement with most of the statements that if ICT tools are adopted and utilized there can be effectiveness in teaching and learning.

The respondents agreed with all the statements that the ICT tools are effective in teaching and learning. The higher level agreements were that; the internet is resourceful in availing information to be used in teaching and provides the fastest means for teachers to acquire information to aide in teaching, Computers and printers help teachers save time in preparation of termly tests and exams and Public address systems enable teachers to teach a much bigger class of students at one go, the least level of agreement was that the camera enables teachers capture information to use in teaching from regions that are not easily accessible.

Given that the all the standard deviations of the mean scores were low with a 99% level of confidence, then the scores are representative enough of the opinions of the respondents.

Findings on the relationship of ICT adoption and Utilization effectiveness towards the teaching and learning process

To determine the relationship between ICT adoption and Utilization effectiveness towards the teaching and learning process the researcher run Pearson correlation between Ict adoption and Utilization and effectiveness of teaching and learning. And the table below reveals the findings.

Table 4.8
Correlation Coefficient

		Effectiveness of Teaching and Learning	ICT adoption & Utilization
ICT adoption & Utilization	Pearson Correlation	.152**	1
	Sig. (2-tailed)	0.25	
	N	123	123
Effectiveness of Teaching and Learning	Pearson Correlation	1	.152**
	Sig. (2-tailed)		0.25
	N	123	123

****. Correlation is significant at the 0.01 level (2-tailed).**

Source: Field Survey 2018

The findings obtained when ICT adoption was correlated with Effectiveness of teaching and learning in selected secondary school in Ilala. A Pearson linear correlation coefficient of 0.152 was obtained. This implies that there is a 15.2% positive relationship between ICT adoption and Utilization and effectiveness of teaching and learning. However given that the P-value was 0.25, which is more than the required maximum of 0.05, the decision taken by the researcher was to reject the alternative hypothesis that there is a significant relationship between ICT adoption and Utilization and effectiveness of teaching and learning.

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Summary of Findings

The findings first looked at the demographic characteristics of the respondents, and it was identified that many of respondents in the research were female educators, had a work experience of at least five years, which made them to be experienced cadres in the field of teaching and thus, hold the attributes that provided the researcher with resourceful information.

The findings on the level of Adoption and Utilization of ICT showed that the adoption & utilization level was low with an average mean of 2.80, 1.98 and a standard deviation of 0.793 and 0.46 respectively. Most of the respondents disagreed with the statements they were subjected to, and only a few agreements were registered. All the statements registered were significant at a 99% level of confidence and therefore the mean scores were representative enough of the respondents view on the level of ICT adoption and Utilization.

The findings to determine the effectiveness of teaching and learning showed that the respondents were in agreement with most of the statements that if ICT tools are adopted and utilized there can be effectiveness in teaching and learning. The respondents agreed with all the statements that the ICT

tools are effective in the teaching and learning process. Given that all the standard deviations of the mean scores were low with a 99% level of confidence, then the scores too were representative enough of the opinions of the respondents.

The summary of the findings on the assessment of teachers' knowledge and applicability of ICT tools (Computers, Printers, Cameras, Projectors, Public Address systems, Cable television, Radio Cassettes and the internet) on the effectiveness of teaching and learning in study centers in Ilala municipality showed that majority of the respondents didn't possess the knowledge on how to effectively apply the mentioned ICT tools in the teaching and learning process.

The researcher further went on to determine the relationship between ICT adoption and Utilization effectiveness towards the teaching and learning process, run a Pearson correlation between ICT adoption and Utilization and effectiveness of teaching and learning.

Recommendations

Basing on the findings of the study there is need for all study centers in Tanzania to be equipped with enough ICT facilities to meet the needs of teaching and learning. School administrators are encouraged to provide enough support to ICT users in their school such that they will be able to use it. Government should ensure that an ICT policy implementation commission should be created and should be funded and given the power to provide ICT facilities in the schools and monitor their use.

Efforts should be made by Ministry of Education to post teachers skilled in ICTs to each secondary school to impart ICT skills to the students.

The training should focus on teachers gaining computer knowledge.

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