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Role of Information and Communication Technology for Teaching and Learning in Tanzania: Use and availability of ICT facilities in TVET

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ABSTRACT

This study investigated the role of Information and Communication Technology (ICT) for teaching and learning in TVET institutions in Tanzania. The study intended to fill in the knowledge gap, whether available ICT facilities in TVET institutions had positive or negative role in teaching and learning. The findings expected to lay the foundation for proper guidance to use ICTs in line with the national ICT policy on proper way and get their actual contribution in teaching and learning for the development of the nation in general. The background information indicated that availability of ICT facilities is essential in teaching and learning in all learning institutions worldwide. The study used a cross section research design with a total sample size 403 respondents and applied a mixed approach of research method for data collection. Questionnaires with open ended and closed ended questions were mainly used to collect quantitative data while observation checklist, documentary review checklist, interviews schedule, and focus group discussion guide, with semi-structured questions respectively, were used to collect qualitative data. Data were analyzed using content analysis and IBM Software Package for Social Sciences (SPSS) version 20.0 then presented in terms of percentage, Chi-square, mean, and frequencies. The study discovered that ICT facilities were not enough by 83(39.3%), however available ICT facilities were used by 85% in teaching and learning. Yet, about 48.82%, of the students had limited time to use computers in their laboratories as such 78.2% of the students used smart phones to access internet for various use anytime. In general insufficient ICT facilities and limited time for students to use the same affected negatively the teaching and learning in TVET institutions. It was recommended that stakeholders such as the Ministry of Education, Science, Technology and Vocational Training as well as NACTE be responsible in delivery of sufficient ICT facilities and encourage its use in all TVET institutions. More specific, further studies should examine proper innovation ICT use in line with curriculum change in global perspectives.

Introduction

Information Communication Technology (ICT) has been acceptable to be used in teaching and learning practice all over the world (Ramadan and Chen, 2018). However, there have emerged some issues along with innovative technologies along with their use within the generic of ICT facilities used in teaching and learning in classrooms situation (Tedla, 2012). ICT facilities have always facilitated smooth communication and relations between students and their teachers. There is significance that (ICT) support excellent education and successful teaching- learning environment for learners and teachers. Yet, ICT facilities have remained to be useful by teachers by integrating and inviting students to learn, access, transmit and simulate information. The use of ICT facilities in classroom instruction creates more practical aspect rather than theoretical transmission of knowledge. ICT facilities are powerful tools that enable practical environment and assists new ways of teaching and learning, which helps to develop knowledge and skills for collaboration and problem solving. The use of ICT facilities in various African Countries and East African in particular, is gradually being internalized along with challenges ranging from number of students in classroom viz-a-viz ICT facilities, lack of skills among teachers and insufficient ICT facilities. The fact that ICT technologies is advancing so fast and new technology facilities are opened for use every day thus teachers sometimes lack confidence to teach in a class using outdated ICT facilities. This implies that ICT integration is not dependent on one factor, but to several interrelated factors that directly or indirectly affects its use in teaching and learning process. In 2003, Tanzania had its first ICT policy in order to modernize Tanzania into knowledge based society through interacting with other scholar by WWW using internet and computer. The aim of promoting ICT in Tanzania vocational and technological forms of knowledge for the development of society was discussed in 2007 ICT policy in Tanzania (URT, 2003; Kafyulilo *et al.* 2015*;* URT, 2007).

Higher education institutions have been implementing different ICT programmes to curb the increased demand for higher learning to better achieve excellence in teaching and learning in Tanzania. For that reason, there is an increasing demand on higher educational institutions to use ICT to instruct the skills and knowledge to teachers' and students who require it in the 21st century (Bakari *et al.,* 2010).

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Ministry of education and NACTE are faced with the challenges of organizing a new creation of teacher and trainers who can capably employ the innovative teaching and learning tool in teaching and learning (URT, 2007; URT, 2010). Understanding the consequence of ICT on the place of work and daily life, could be an essential step in improving the excellence of education. Currently higher educational institutions struggle to restructure their learning curricula and classroom facilities, for the aim to overpass the existing technology gap in teaching and learning (Buabeng-Andoh, 2012).

Study Objectives and Aim

The general objective of this study was to investigate the role of ICT in teaching and learning in TVET institution in Tanzania. Specifically, the study evaluated the availability of ICT facilities and its use in TVET institutions. This paper aimed to help vocational education teachers and students gain new understanding of teaching and learning using ICT in TVET institutions as recommended by NACTE. Studying the use and availability of ICT could provide assistance to teachers on how to use the available facilities aim at improving the quality of ICT for teaching and learning. To enhance the investigation the study employed two key questions. The first was, are ICT facilities available in TVET for teaching and learning? The second was to what extent are the ICT facilities used by teachers and students in TVET for teaching and learning process?

Literature Review

Reviewed literature indicates that ICT facilities are a generic of electronic tool used to facilitate information. They range from computer (both laptop and desktop), smartphone and internet. In TVET institutions, ICT facilities enhance teachers and students use WWW in accessing materials online. Computer and internet too facilitate students and teachers to interact with their fellows worldwide and participate in the process of education (Sife *et al.*, 2007). The advent of ICTs in learning institutions have affected the field of education in terms of teaching, learning and research (Yusuf, 2005). For many years the conventional teaching under Knowledge Based Learning (KBL) emphasized content. Teachers taught through lectures and presentations interspersed with tutorials and learning activities designed to consolidate and rehearse the content. Contemporary settings under Competence Based Education Training (CBET) curricula focus on capabilities and on how the information should be used rather than what the information is. ICTs provide strong support for realizing competency and performance-based curricula that make sound use of the affordances learning resources (Oliver, 2000). Under CBET, ICT has automatically changed the nature and process of teaching-learning from dependence to autonomous, rigidity to flexibility, from monopolistic to sharing, and from individualism to collaboration. For learners' to maintain sustainable use of ICT under CBET, teachers must prepare students for more complex and long-term technology projections. The strategic move expects to equip learners with learning skills that encourage self-paced learning through autonomous learning strategies which suit changing needs (Majumdar, 2011).

Empirical studies reveal that various scholars have attempted to examine the use of ICT in teaching and learning at different country. In developing countries, studies suggest that ICT helps to address issues of educational equity and social exclusion and open up democratic and accessible educational opportunities (UNESCO, 2002). Islam and Selium (2006) show that in Bangladesh, ICT has been used as an initiative to overcome the challenge to reach a lot of people at different places. Again, Alassaf (2014) investigated the use of ICT in undergraduate levels at Jordanian Universities. Similarly, the study by Alazam *et al.,* (2012) in Malaysia observed the levels of ICT skills and ICT use in the classrooms among technical and vocational teachers. Likewise, Crittenden (2009), Alseddiqi *et al* (2009) and Bezjack, (2010) shows that using ICT facilities like computer, internet, CD ROM, Video Player, Camera, smartphone and other computer Aided design Auto CAD, 2D or and 3D modeling in teaching and learning process not only smoothen learning process but also liven collaboration between teachers and students. In Sub-Sahara Africa ICT has been used for wider access to basic education. For instance, the University of Malawi, the Open University of Tanzania, the Open University of Ghana and the University of South Africa have the centre for ODL which uses ICT to make students' dreams come true (Chawinga & Zozie, 2016; Owusu (2014). In Tanzania, Shao and Seif (2014) investigate the adoption of mobile phones among university students and their thoughts on the uses of the hand phone as a place for class learning and search for argument for instructive resources. The study concluded that mobile phones were hopeful devices for delivering learning resources to students. Above all, Mtebe and Raisimo (2014) assert that although there is an increasing awareness of the importance of ICT to improve educational standards all over the world, there are challenges such as, lack of qualified teachers, lack of experts, insufficient ICT tools for the teacher to use in teaching and learning. There is a need to develop sustainable ICT infrastructure and the available Open Education Resources (OERs) in order to smoothly accomplishment the millennium development goals.

Methodology

The study employed mixed method approach in order to ease data collection and analysis as suggested by Creswell and Plano Clark (2011). Study used cross section design. Three old and fundamental government TVET institutions namely, Arusha Technical College (ATC), Arusha Vocational Training Centre (AVTC), and VETA Hotel Tour guide Training College (VHTTI) were singled out following their long experience in ICT use in Arusha region. It was expected that the older the TVET since its establishment experienced a lot with regards to ICT as such had rich information for the study. A total number of 403 respondents participated whereby192 were vocational education teachers

Table 1. Summary of Sample Size of the Study

S/N	Selected Respondents	Expected Respondents			Sampling Methods	Tools
		M	F	Total		
1	Students	144	67	211	Randomly	Questionnaires/ Interview/FGD
2	Teachers	138	54	192	Purposive	Interview/Observation/ Questionnaires
	TOTAL	282	121	403		

Source: Field Data, 2019

and 211 were students. The sample size was based on a qualitative approach in line with Patton (1990). Validity and reliability of data were made by discussing research instruments with supervisors to avoid data distortion; authentic respondents were involved and crystallizations were employed to crosscheck accuracy as advised by Denscombe (1998) and Keya, et al., (1989). Data were analysed through content analysis and International Business Machine (IBM) Statistical Package for Social Sciences Microsoft Excel Version 20.0 (SPSS). Table 2: summarizes the sample size of the study.

Findings and Discussion

The study involved both females and males teachers and students from three TVET institutions in Arusha region with a total number of 403 as summed in Table 2.

Table 2. Characteristics of Respondents

S/N	TVET Institutions	No. of Vocational Teachers			No of Students		
		F	M	Total	F	M	Total
1	ATC	22	88	110	48	126	175
2	AVTC	22	37	59	10	12	21
3	VHTTI	10	13	23	08	07	15
	TOTAL	54	138	192	66	145	211

Source: Field Data, 2019

Table 2. Show that majority of students 145(68.7%) were male than 66(31.3%) female students. This result suggests that the fields studied by the respondents were not much likely taken by female students as shown in Figure 1.

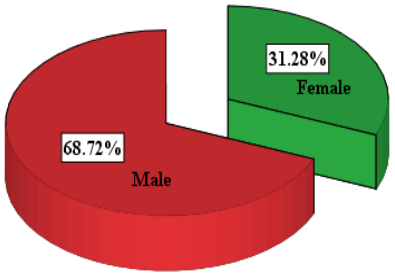

Figure 1. Students respondents by Gender
Source. Field data (2019

Again, there were 138 (72.40%) males vocational teachers and 59 (27.60%) female vocational teachers as shown in Figure 2.

With regards to availability of ICT facilities in TVET institutions, in the first instance, students were administered with questionnaires and asked to put a tick to indicate YES or NO against items related with availability or unavailable of Computer in Computer laboratory and freedom for access in using the same respectively. The findings were summarized as shown in Table 3. The study found that insufficient computers and lack of access to computers and internet was the barrier on the implementation of ICT in teaching and learning on higher learning institution in Tanzania. Findings also shows that there is statistical significant relationship between availability of computer and number of computer in terms (enough or insufficient number). This finding shows that despite the availability of computer laboratories at these

Table 3. Availability of ICTs at the Institutes

INSTITUTES						
VARIABLE	ATC N=175	AVTC-OLJORO N=21	VHTTI-NJIRO N=15	MEAN	f	χ^2
ICT						41.981*
No	45.7	57.1	73.3	58.7	103	
Yes	43.4	19	20	27.5	83	
Not sure	10.9	23.8	6.7	13.8	25	
Access						89.64*
No	13.7	42.9	6.7	21.1	34	
Yes	66.3	47.6	60	58.0	135	
Not sure	20	9.5	33.3	20.9	42	
ICT						307.46*
No	7.4	23.8	6.7	12.6	19	
Yes	91.4	76.2	93.3	87.0	190	
Not sure	1.1			1.1	2	
Significant: *P< 0.05,**P=0.01,***P=0.001,ns=Not significant						

Source: Field work 2019

Table 4. Students Access of Internet for Various Uses

INSTITUTES						
VARIABLE	ATC N=175	AVTC-OLJORO N=15	VHTTI-NJIRO N=21	MEAN	F	χ^2
ICT						23.891*
No	66.9	66.7	66.7	66.8	141	
Yes	33.1	33.3	33.3	33.2	70	
PC						20.024*
No	62.9	76.2	80.0	73.0	138	
Yes	37.1	23.8	20.0	27.0	73	
Cafe						56.308*
No	74.9	76.2	86.7	79.3	160	
Yes	25.1	23.8	13.3	20.7	51	
Phone						67.114*
No	20.6	23.8	33.3	25.9	46	
Yes	79.4	76.2	66.7	74.1	165	

Significant: *P=0.05, **P=0.01, ***P=0.001, ns=Not significant
Source: Field work 2019

TVET institutions, there were very few ICTs equipment/material in these laboratories shown by 9% respondents. The large value of χ^2 Chie square statistically implies small probability of occurrence by chance alone, *P< 0.05. The null hypothesis must be rejected.

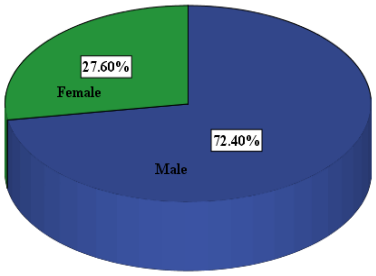

Figure 2. Vocational Teachers Respondents by Gender
Source: Field Data, 2019

There is significant association existing between the availability of computers and the number of computers. The same applies to availability of computer in the laboratory and freedom to access which is also statistically significant (McHugh, 2013; Fraenkel *et al.*, 2012; Backhaus *et al*., 2002). For small value of χ^2 Chie square statistically implies large probability of occurrence by chance alone *P >0.05. The Null hypothesis must be accepted. No association exists, and not statistically significant. It should, however, be noted that standard significant levels equal are 0.01, 0.05, and 0.001 but any between 0 and 1 can be used. Chi- Square is a test that can be used to look a relationship between two variables when variables are categorical so the data are nominal (or frequency) (Franke and Christie, 2012)

Table 4. show different facilities option through which internet was accessed by students. The findings shows that about 144 respondents did not use college desktop for accessing internet, 70 respondents accept to use college desktop. 138 disagree of using personal computer (Laptop) to access internet, while 73 accept to use it. 165 students accepted to use smartphone to access the internet, and only 46 were not using smartphone. This was probably because there were no enough computer at the college for students to access for free, and as well as no internet is connected to most computers at the college.

Due to cheapness of internet when using smartphone, most students used smartphone to access internet. Study on the use of ICT in implementation of curriculum in higher learning institutions in Tanzania done by Kayange and Loppa (2014) showed that, application of computers in teaching, learning and the use of internet is still in it mature stage in developing countries due to inadequate infrastructure and the high costs of admittance. Vocational teachers were asked from interviews whether they trained students in using ICT. About 85% of vocational teachers confirmed to teach students in using ICT facilities. Again majority of vocational teachers used power point presentation as their main instructional methods supplemented by videos, spread sheet, using formula in excel, simulation use, and Auto CAD. The findings concur with the findings by Nkanu (2007) as well as Ani (2012) who revealed that ICT facilities were mostly used to present lessons in classrooms.

Insufficient of ICT facilities contradicts VETA regulations that require every VTC to have enough training facilities in their workshops or laboratories. This might reduce the efficiency of the facilities because of having too many session of repeating the same teachings as well students will get tired and get bored for waiting for their session. Having laboratories or workshops could be important and define meaning if it could be with enough ICTs facilities for better practice of the students (Mutarubukwa, 2006). The researcher also found that due to absence of enough ICT facilities, the laboratories or workshops practice should be done into various special sessions. The study noted experience from a Kenya institution a teacher from one TVET institute in Kenya said that the administration told teachers to buy computers for teaching. In the beginning teachers thought that they have been punished with their principal when he announced that each member of the staff must have to buy a laptop. No one agreed with him, But in the next few weeks time at least 90% of them had a laptops for teaching and it was working miracles URT (2016).

Conclusion

It is concluded that the role of ICT through teaching and learning on TVET in Tanzania is very essential. The finding of this study has shown Tanzania TVET institutions have insufficient ICT facilities for the vocational teachers and learners to use. Also the ability to use ICT facilities by students is very low but vocational teachers can manage to use the available ICT facilities only if they plan efficiently the available ICT facilities.

Recommendation

It is recommended that the stakeholders of TVET like Ministry of education and NACTE should ensure the availability of ICT for the vocational teachers and students to use for teaching and learning at TVET and other educational institutes. The education stakeholder should raise funds for the educational organization with more emphasis on ICT integration in teaching and learning. This will encourage the altitude of ICT facilities in the TVET institution to a new sphere. Again, ICT use achievement agenda should be initiated for teachers and students. Such agenda will offer teachers and students with practical understanding of the computer. ICT use and training will assist students and teachers to learn, teach or update their information on the internet and linked areas of ICT. Such information and practices will progress the teaching and learning environment in TVET in Tanzania leading to technological growth.

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