Teachers and students strategies to enhance teaching and learning through Information Communication Technology at Technical Vocational Education Training in Tanzania

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ABSTRACT

This study investigated strategies teachers and students use to enhance teaching and learning through information and communication technology (ICT) at Technical Vocation Education and Training (TVET) in Tanzania. The study used a cross sectional survey design and applied both qualitative and quantitative approaches. The study was conducted at two Vocational Training Centers (VTCs) namely, Arusha Vocational Training Centre (AVTC) and Arusha Technical College (ATC-VET). These institutions are situated in Arusha region.

Data was collected from a sample of 164 respondents through questionnaires, interviews, focus group discussion (FGD), documentary review and observations. Findings revealed that 59% of the students use Smartphone to access internet for various purposes. Smartphone is user friendly in terms of portability and have special mobile phone lines offered by telecommunication companies which provides cheap air time and Mega Bytes of internet for students' daily use. Again, it was discovered that 29% of teachers use overhead projectors in teaching. The study concluded that there is a need to have new initiatives to enhance teaching and learning strategies through ICT in TVET colleges. The initiatives should not beyond the use of projectors and Smartphone to the extent of t establishing training with a variety of ICT use in teaching and learning process. The study recommends that the Ministry of Education, Science, Technology and Vocational Training should sponsor TVET teachers to attend seminars on different application of ICTs in order to expose them to new skills that can be used to overcome variety of challenges related with ICT uses in teaching and learning especially to long experienced teachers. Above all, for further action, there is a need to conduct research on ICT in integration with other stakeholders to observe strategic planning in the use ICT policy.

Key words: ICT, teaching and learning, Technical Vocation Education and Training (TVET)

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Introduction

Teachers use different tools to improve their teaching skills and guide students learning by the use of various teaching materials and assistive technologies in coping with academic skills. The advent and use of Information and Communication Technology (ICT) in learning institutions suggest new innovation determined to improve teaching and learning in various levels of learning institutions in general and in Technical Vocation Education and Training (TVET) in particular (Liu & Clayton, 2016). For the purpose of this study the term ICT refers to a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information (Ser, 1997) too define ICT as a generic term used to express the convergence of information technology broadcasting and communications. According to Mikre (2011), ICT is as computer and internet communication used to handle and communicate information for learning purposes. The prominent examples to represent ICT are like the computer, Compact Disc, Read-Only-Memory (CD-ROM), local area network (LAN), modem, iPad, smartphones, internet, telephone, teleconferencing, television (TV), interactive television (iTV), videoconferencing equipment, Audiographics, radio, Web-Based Training (WBT) Programmes, videotape, and Audio-Cassette Tape (cassette player).

Unlike the traditional teaching and learning process, currently ICT as a new instructional methods for teaching and learning plays a motivating role in promoting self-paced learning (Schuwer & Janssen, 2017), network learning (Fleeson *et al.,* 2017), and online discussion (González, 2010). Effective use of ICT facilitates student-cantered active learning (Ellis,

Goodyear, Calvo, Prosser, 2008), engage students in collaborative learning as well as enhance their social interaction (Dodge *et al.,* 2003).

ICT simplifies and sustain teaching-learning process and offer opportunities for successful communication among teachers and students (Iding *et al.,* 2002; Shamatha *et al*., 2004; Bingimlas, 2009). However, studies have noted that, ICT use has never survived without challenges. Challenges were evidenced by Mahani and Molki, (2012). that although students realize the application of ICT for sustaining their learning at everywhere and anytime, they meet a number of challenges which do hinder smooth learning process. Challenges were including insufficient computers for teaching and learning.

In Tanzania, the TVET Policy was enacted in 1996 to enhance the establishment of the it with eleven specific objectives, namely: to train sufficient numbers of skilled, competent and reliable technicians and technologists, to meet the needs of formal and informal sectors; too establish, maintain and consolidate training institutions by equipping them with sufficient manpower and facilities for high quality training; to promote coordination between educational, manpower and economic planners, through the Vocational Education and Training Authority (VETA) and National Council for Technical Education (NACTE); to ensure that technical education and training at all levels of education is properly integrated with the national economic programmes; to promote a self employment culture through entrepreneurship education; to promote indigenous and endogenous technologies; to ensure that, the national technical education and training standards match with international standard classification of occupation; and to encourage women participation in technical education and training (URT, 1996).

Based on policy issues stated above, TVET in Tanzania is divided into Vocation Education and Training (VET) and Technical Education and Training (TET). VET is under the mandate of the Vocational Education and Training Authority (VETA), a statutory body established by Act No.1 of 1994. TET is under the National Council for Technical Education (NACTE), a statutory body established by Act No.9 of 1997. VETA and NACTE were established respectively pursuant to the VET Policy paper (1992) and TET Policy (1996). Both VETA and NACTE are accountable to the Ministry of Education, Science, Technology and Vocational Training (MoESTVT). Basically, TET is pure technical institutions whereby VET is purely vocational institutions. Along with the TVET Policy of 1996, the National ICT Policy of 2002, the Tanzania National Strategies for Growth and Development Vision 2010-2015, and the National Five Year Development Plan (FYDP) 2016/17-2020/21 work as a team to encourage the use of ICT in teaching and learning not only in TVET colleges but also at all levels of education system (UNESCO-UNEVOC, 2016). (**TVET**) definition adopted from UNESCO, is the study of technology and related sciences and acquisition of practical skills, attitudes understanding and knowledge relating to occupants in various sectors of economic and social life, is an education and training which grant knowledge and skills for employment, the definition used in this study analogous to the comprehensive definition adopted in the ILO recommendation on TVET for the twenty first century as TVET is those feature of the education process employing in additional to general education, the study of technologies and related sciences and acquisition of practical skills, feelings perception and knowledge relating to occupations in various factors of economic and social life (UNESCO, 1999; ILO, 2015 ;URT, 2003).

Basically, numerous studies have been undertaken to investigate the use of ICT in facilitating the teaching and learning in schools and colleges. Some endeavoured to explore the adoption of ICT

as media for instruction and its contribution in the improvement and advancement of learning, teaching, research (Achimugu, Oluwagbemi, & Oluwaranti 2010; Cuban, 2001; Liu & Clayton, 2016). Others focused to determine the relationship between ICT and students' performance (Almas & Krumsvik, 2008; Al-Qahtani & Higgins, 2013; Ndibalema, 2014). These studies have not been able to establish precisely the actual practice of ICT use in TVET colleges. As such two key questions emerge: The first was how useful is ICT in teaching and learning process in TVET colleges? The second was how students and teachers cope with technological changes that takes place now and then vis-à-vis curriculum review for students to develop competencies that help them survive in the ICT era? It was on that background that this study sought to examine the strategies teachers and students use to enhance teaching and learning through ICT in TVET.

Literatures reveal that ICTs use in learning institutions have affected the field of education in terms of teaching, learning and research (Yusuf, 2005). Prior to ICT, conventional teaching under Knowledge Based Learning (KBL) has emphasized content written around textbooks. Teachers have 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) along with ICTs curricula are designed to promote competency and performance. Curricula are starting to emphasize capabilities and to be concerned more with how the information will be used than with what the information is. ICTs provide strong support for all these requirements and there are many outstanding examples of world class settings for competency and performance-based curricula that make sound use of the affordances of ICT (Oliver, 2000 cited in Ghavifekr, Kunjappan, Ramasamy and Anthony, 2016).

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 will assure changing needs (Majumdar, 2011). The strategic move for learners to have a self-paced learning, the key emphasis of ICT blend into pedagogy should be such that it tends to develop learning, encourage and employ learners, support collaboration, promote enquiry and discovery, and build a new learner-centred learning culture, a bold reaction to knowledge explosion that has taken place and expressed. Teachers are anticipated to build new flexible and open learning surroundings with an interactive, empirical and multimedia based delivery system.

The process of examining strategies teachers and students use to enhance teaching and learning through ICT in TVET was guided by the conceptual framework from the researcher's own construction. On the basis of the framework, the strategies are not only the function of apparent relationship between independent and dependent variables but also the influence of intervening variables as summed in Figure 1.
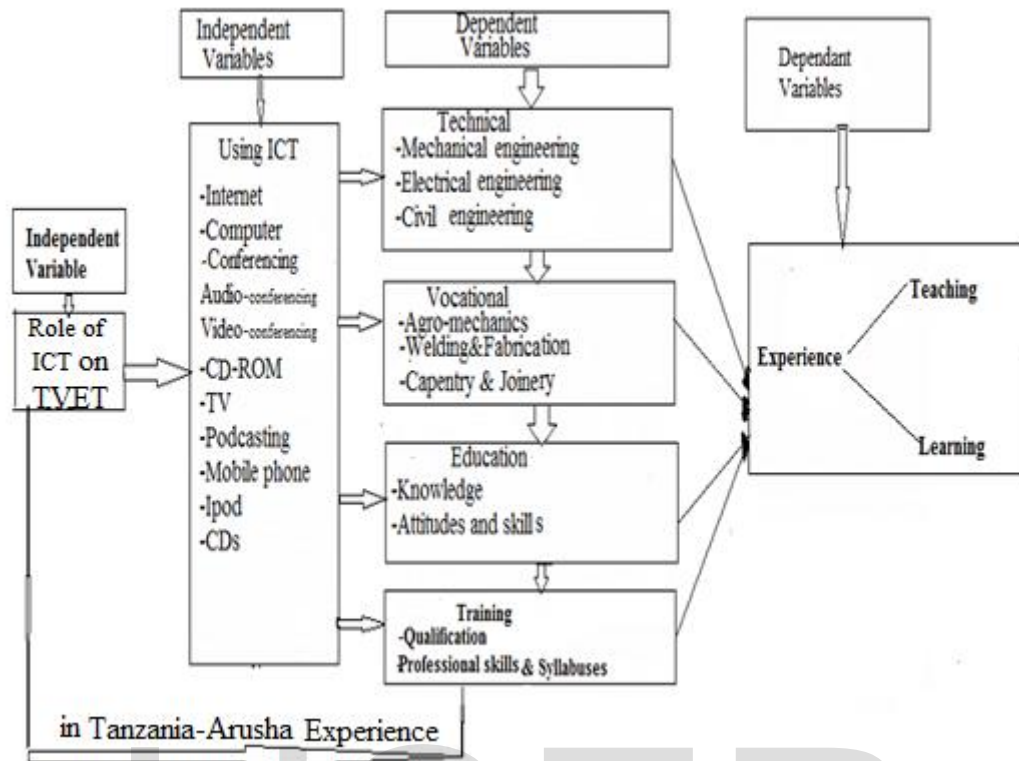
Figure 1: Independent vis-à-vis dependent variables
Source: (Researchers own construction. 2018)

Independent variables comprise of ICT facilities available in TVET and on the other hand dependent variables consists of teachers profession and working experience with reference to different programmes conducted in TVET colleges in terms of technical, vocational, educational and training. ICT facilities are considered to be "inputs" which teachers use to satisfactorily deliver the expected "output" for each TVET. On the basis of this conceptual framework, "output" is viewed in terms of efficiency in teaching and learning as well as increase in availability of learning materials for TVET programmes. It should, however, be noted that there might be barriers that could hinder teachers from effective use of ICT in the classroom. Such barriers are considered to be intervening variables. For the purpose of this conceptual framework, intervening variables and barriers were used interchangeably as defined by Schoepp (2005) to mean any condition that makes it difficult to make progress or to achieve an objective.

There are several factors that can inhibit the use of ICT during classroom instruction. Some factors are institutional (internal) while others are community based (external) yet others are teacher's personal issues. Intervening variables affect the one to one function relationship between ICT tools and TVET thus cause unexpected outputs. These factors can be categorized into non-manipulative and manipulative factors. Non-manipulative include factors, such as teachers age, teaching experience, and ICT literacy. Manipulative factors consist of availability of ICT infrastructures, government policies, and availability of external support, teacher's attitude, phobia, and personal interests in using ICT.

METHODOLOGY

This study employed a cross sectional research design where both qualitative and quantitative approaches were employed on the basis of Creswell and Plano Clark, (2011). The study was conducted in Arusha whereby two old and fundamental government TVET institutions namely, Arusha Vocational Training Centre (AVTC), and Arusha Technical College (ATC-VET) were the focus following their long experience in ICT use. It was expected that the older the TVET had long experience with regards to ICT as such had rich information for the study.
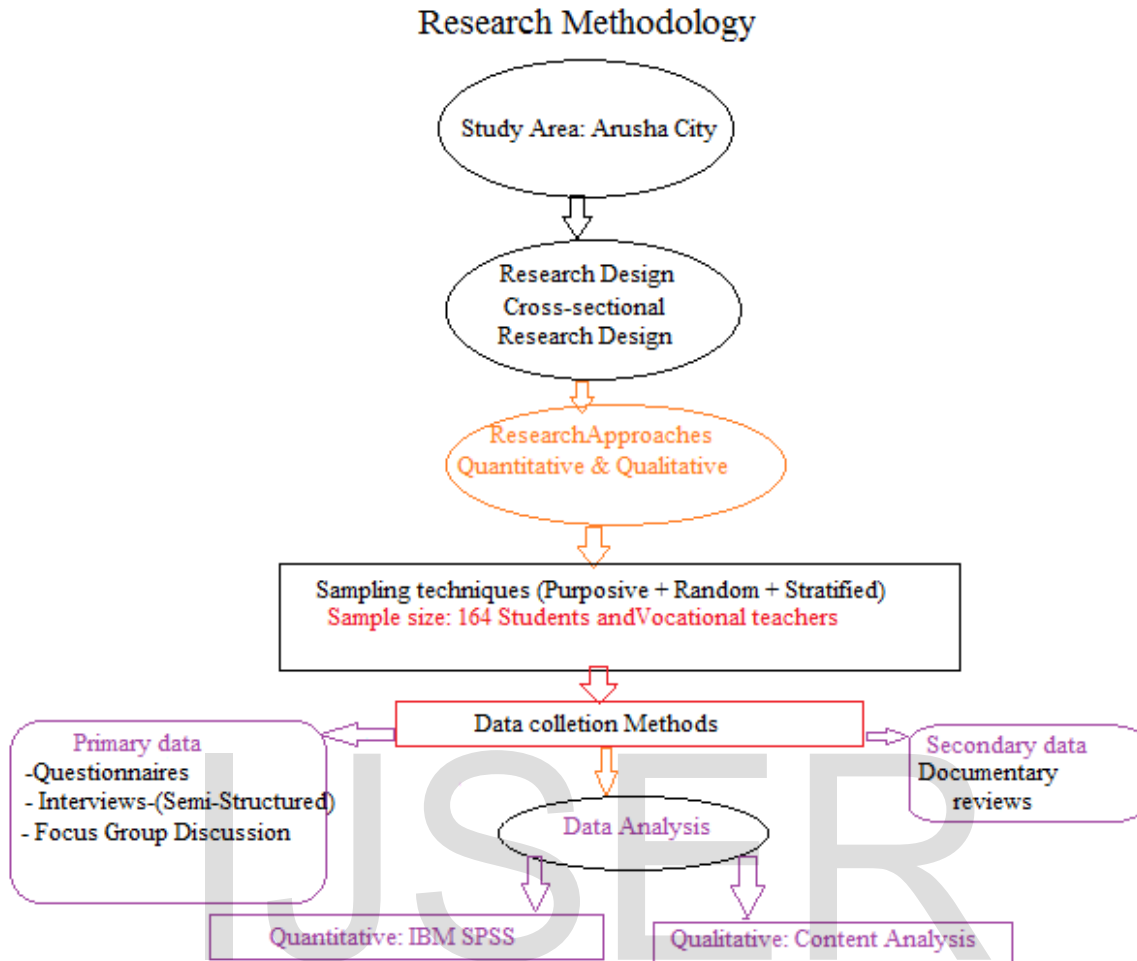
Figure 2: **Summary of Research methodology**
Source: Researchers Own Construction (2019)

The study involved a sample size of 164 respondents where 48 were Vocational teachers and 116 were students based on qualitative and quantitative approach in line with Patton (1990) as summarized in Table 1.

Table 1: Summary of Sample Size of the Study

S/N	Selected Respondents	Expected Respondents			Sampling Methods	Tools
		M	F	Total		
1	Students	71	45	**116**	Randomly	Questionnaires/ Interview/FGD
2	Teachers	33	15	**48**	Purposive	Interview/ Observation/ Questionnaires
	TOTAL	**104**	**60**	**164**		

Source: Field Data, 2019

Data collection instruments were semi-structured questionnaires, interview schedule, FGD guide, documentary review checklist and observation checklist. The questionnaires were the main research instrument for gathering information from vocational teachers and students. 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).

RESULTS

The result of this study was organized into three sub-themes namely, demographic characteristics of the respondents, the use of ICT in TVET, and availability of ICT, vocational teachers' uses of ICT in TVET, students accessibility and use of ICT facilities, students' use of different Web, and ICT strategic plan harmonization as each explained in the following details .

The demographic characteristics of the respondents were summarized in Table 2.

Table 2: Demographic Characteristics of Respondents

S/N	TVET Institutions	No. of Vocational Teachers			No of Students		
		F	M	Total	F	M	Total
1	AVTC	05	14	**19**	08	13	**21**
2	ATC-VET	10	19	**29**	37	58	**95**
	TOTAL	**15**	**33**	**48**	**45**	**71**	**116**

Source: Field Data, 2019

From Table 2, there were 58 males and 37 female students respectively at ATC-VET while there were 13 males and 08 female students respectively at AVTC. The findings for students in terms of gender were summarized in frequencies and percentage as shown in Table 3.

Table 3: Students respondents according to Gender

INSTITUTE		FREQUENCIES	PERCENTAGE (%)
ATC	Male	58	50
	Female	37	31.9
	Total	**95**	**81.9**
AVTC	Male	13	11.2
	Female	08	6.9
	Total	**21**	**18.1**

Source: Field Data, 2019

From Table 3 the findings revealed that 50% of the students male students from ATC-VET followed by 31.9% of female students from the same. Finally, about 11.2% were male students

and 6.9% were female students from AVTC respectively. Likewise, from Table 2, there were 19 vocational male teachers and 10 vocational female teachers respectively at ATC-VET whereas there were 14 vocational male teachers and 05 vocational female teachers at respectively at AVTC. Again the findings were summarized in frequencies and percentage as shown in Table 4

Table 4: Vocational teacher respondents according to Gender

INSTITUTE			FREQUENCIES	PERCENTAGE (%)
ATC		Male	19	39.6
		Female	10	20.8
		Total	**29**	**60.4**
AVTC		Male	14	29.2
		Female	05	10.4
		Total	**19**	**39.6**

Source: Field Data, 2019

From Table 4, the findings show that there were 39.6% vocational male teachers from ATC and 29.2% vocational male teachers from AVTC. Likewise female vocational teacher were 20.8 % at ATC and 10.4 at AVTC. Total male percentage was 68.8% while total female percentage was 31.2% to make a total of 100% of vocational teacher respondents.

The findings suggest that there were more male students and vocational teachers at both colleges compared with females. In other words, engineering and ICT subjects compared to females and at the same time employed more vocational male teachers compared to female. This findings shows that the field of engineering is taken by most males than female, many females thought that engineering subjects was for males because the nature of subjects are not easy.

Findings revealed that 68% of VETA institutions had computer laboratories but had no enough computers for each student in a single session. About 19% of students owned personal computers and just 13% of computer were available in computer laboratories

The study discovered that due to limited number of computers in laboratories the possibility of teaching students by Computer Aided Design (Auto CAD) was limited. Most of the students face challenges with absent of computer in the computer rooms is leading (31%) followed by absence of ICT skilled tearcher (15%), lack of internet (7%), and the problem in computer language among students when running various programs (5%). Again the available and few computers in the laboratory causes students miss some important programmes and large number of students in a class compared with the available computer cause students not comprehend (3%). Electricity cut for some times while students are in session (2%) yet is another challenge, and some students fail to understand when teachers use power point presentation through over head projector (2%).

During FGD the study revealed that most vocational teachers' 36% used ICT in preparing handout, while 29% used the projectors in teaching. However 14% didn't use any ICT facility whereas 14% used ICTs in searching for materials from the web and 7% used to display the Video.
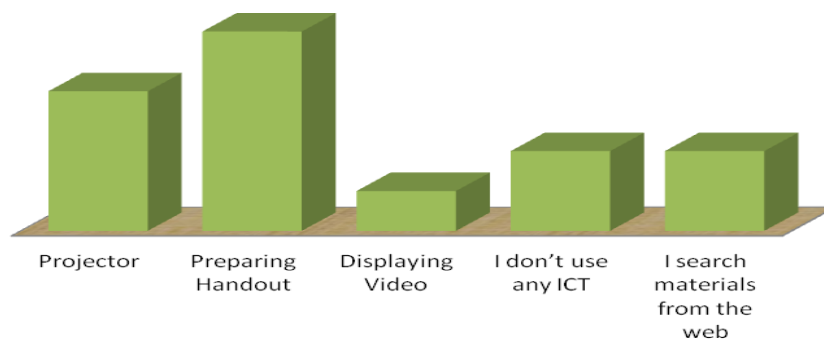
Figure 3: Various Ways vocational teachers' uses of ICT in TVET

In order to understand students accessibility and use of ICT facilities, students were administered with questionnaires whereby collected findings were here summarized.

The findings revealed and computed in percentage whereby 59% of the respondents use Smartphone to access internet for learning, followed by 17% who used their own laptop to access internet for learning, 12% who used college computer and 6% who depend on internet cafe.

Likewise the findings revealed that about 36% of students used Youtube followed by 30% who used WhatsApp, 17% who used Instagram, 11% who used Facebook, 3% who used JamiiForum and 3% who used Twitter. (Figure 4).
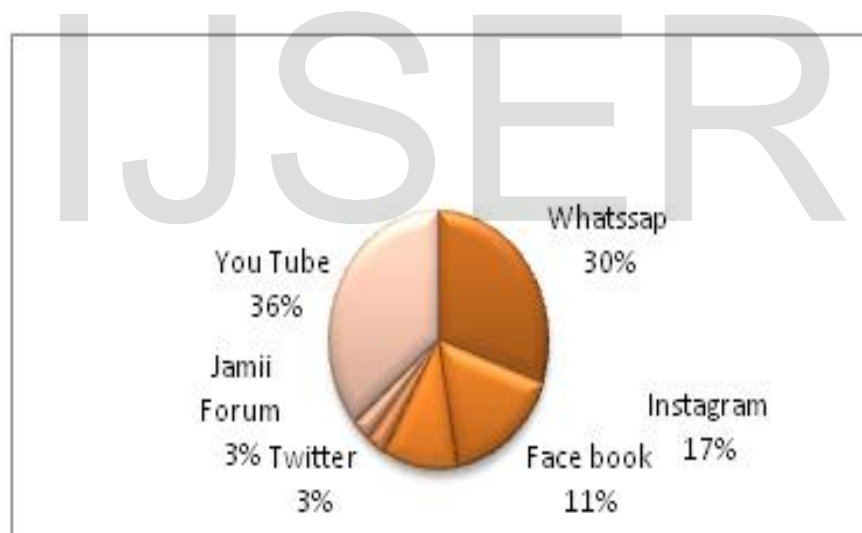
Figure 4 Web used by Various Students' Respondents
Field Work: 2019

The study findings imply that most of the time students engaged themselves with the social web. Although it was not intended to probe the kind of materials they learnt in social web, more often students used social web for socializing rather than learning in line with their academic matters.

The study revealed that various strategies were used by vocational teachers to train their students in using ICT as summarized in Table 5.

Table 5: ICT Strategic Plan Harmonization

Feature:	Institute	
	ATC	AVTC-OLJORO
Examination Management System (EMS)	SMS/VET-MIS	VET-MIS
Awareness	Yes	Yes
ICT training for teachers	No	No
Enhancing life-long learning	BAND WIDTH	MODERM

Source: Field Data, 2019

Findings from Table 5 were collected during FGD whereby both students and vocational teachers were using the Examination Management System (EMS). Starting from the beginning of term vocational teachers used SMS or VET-MIS to fill results of the students in it, these include test marks and final examination marks. Using their password students saw their results.

DISCUSSION

Based on the findings the discussion was arranged into three sub-themes namely, respondents, challenges related with ICT use in TVET, strategic plan for ICT use in TVET as shown below.

The fact that there were more male students and vocational teachers at both colleges compared with females such disparities did not affect the findings but gave more implication with regards to specialization in engineering subjects. That is, females were less interested with engineering studies as such deliberate efforts is needed to enhance more females to join the same. The

findings concurred with what Geoffrey (2014) in his study that were associated with other researchers who reported that low number of in many learning institution of education female students and vocational teachers were few compared with male students and vocational teachers.

The use of ICT facilities in terms of computer, Smartphone, projector, Instagram, twitter, Face book, Jamii forum, Youtube and WhatsApp found to pose challenges related with awareness of ICT language, inadequate facilities, lack of experienced teaches and misuse of the same apart from academic purposes. According to Kibona (2015) the misuse of Smartphone has become a challenge in the sense that nearly every student in all levels of learning institutions uses the facilities out of academic purposes. Again, challenges related with student misuse of Smartphone for academic purposes were evidenced from the study by Mtega, Bernad, Msungu and Sanare (2012). The study revealed that about 70% of the respondents used the Smartphone but about 43% of the respondents didn't know how to operate the installed systems found in their Smartphone. Some of the installed systems were like RIM's Blackberry, Android, Nokia, Symbian, Microsoft word, and Samsung Bada. About100% of the teaching staff were found to using their Smartphone for Short Message Services (SMS), while 84% for internet access, yet 68% used for multimedia services and 64% found to use web2.0 applications like instagram, twitter, Face book, Jamii forum, You tube and WhatsApp.

With regards to application of ICT strategies were aligned with minimizing problems in terms of lack of internet provider by using Modem and Bandwidth. The findings were in line with Sife *et al* (2007) who found that students and teachers have to change their behaviour and learn how to apply a variety of ICT facilities in teaching and learning. In addition, to Marwa (2016) revealed that various higher learning institutions like UDSM, OUT, MUHAS, and MU started ICT policy

and strategic plan to enhance e-learning using Moodle as learning management systems for learning purposes, registrations and chatting discussing with each other to reduce gap among instructors and learners. According to Marwa (2016) whatsApp is a leading 63.20% web to be used by students followed by You Tube 56.4% , he suggest that WhatsApp can collaborate with big number of students at a time than Moodle, Jammii forum, You Tube, face book, twitter and instagram.

On the bases of the findings it was concluded that there is a need of having new initiative to enhance teaching and learning strategies in ICT use in TVET colleges. The study conclusion is on the need to reinforce the ICT components of vocational teachers and students programs on the positively and effectively use of ICT. The challenges like problems related to the access and use of ICTT contributed negatively to teachers and students teaching and learning because vocational teachers and students were found with insufficient computers in computers laboratories, also the vocational teachers are affected by lack of ICT training and absence of strategic planning. ICT incorporation in teaching and learning should not only relay on use of projectors and Smartphone but rather aim at strengthening training with various ICT use in teaching and learning processes.

The study recommended that the Ministry of Education Science Technology and Vocational Training should sponsor TVET students and teacher to attend ICT courses in learning and teaching especially for the long services teachers. The study also recommended that for the prospects study there is a need for research on ICT in integration with other stakeholders to observe strategic planning in ICT policy use.

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