Use and Challenges of ICT in Secondary Schools in Tanzania: *A study of Selected Secondary Schools in Mikindani Municipality, Tanzania*

Peter Joseph
Tanzania Institute of Accountancy, Mtwara Campus
Email: munuo@gmail.com

Received: July 2021
Reviewed: September 2021
Accepted: October 2021
Published: December 2021

Abstract

Information and Communication Technologies are crucial in improving teaching and learning in secondary schools. Despite the efforts of integrating ICT use in secondary schools, challenges are still frequent. This had three objectives to examine the level of ICTs use in teaching and learning, to evaluate the benefits of using ICTs for teaching and learning and to determine the challenges of using ICTs for teaching and learning in secondary schools. This cross sectional and descriptive study sought to establish the ICT status in terms of use and challenges in the selected secondary schools in Mtwara Mikindani Municipality, Tanzania. A sample of 120 secondary school teachers were involved, the study data were collected mainly through questionnaire supplemented by key informants interviews. The study results show ICT facilitate teaching and learning, it widens access to education resources, it enhances learners understanding, it facilitate learners to work collaboratively and it improves learners engagement in the lesson. Poor ICT infrastructure, lack of ICT skills and knowledge, lack of technical support and lack of teachers' training were the critical challenges limiting the use of ICT for teaching and learning in secondary schools. This study concludes that ICT use is beneficial to both students and teachers, and that the level of ICT use is low due to many challenges outside the of schools' ability to address. Accordingly, the study recommends that, policy makers to make it mandatory schools to invest in

ICT infrastructure including computer laboratory and recruitment of specialised technician in every five schools for providing technical support.

Keywords: *ICT, Challenges, Secondary school Teachers, Tanzania*

1.0. Introduction

The Information and Communication Technologies (ICTs) have been a driving force of various activities, contributing to national growth and development. Both developed and developing countries acknowledge the importance and the value of ICT tools for their social and economic development. In everyday economic activity, ICT has become an important driver and an agent of change for better. In the education sector, many researchers have also tried to make use of the great potential of ICT, which provides teachers with exciting and effective opportunities in their teaching activities. Currently, students, immersed in technology from a very early age, spend much of their time using computers, smart-phones and digital media (Cha, Park and Seo, 2020). As a result, for these students to be engaged in education, the integration of technology into learning environments and teaching contexts is indispensable. In a global context, academic institutions of all types and levels including secondary schools acknowledge ICT usage as a gateway for improving the provision of education and their performance (Ullah et al., 2019; Humbhi and Tareen, 2021; Lei, Xiong, Chiu, Zhang and Cai, 2021).

ICT has dramatically reshaped teaching and learning processes and greatly contributed to the advancement of education in schools globally. ICT facilitates in terms of both instructional and learning process (Kihoza 2016; Maharaj-Sharma, Sharma and Sharma, 2017; *Mwapwele, Marais, Dlamini & Van Biljon, 2019*) have huge influence on teaching and learning in secondary schools. It provides the opportunity for personalizing, and making learning flexible and asynchronous and shifting the learning experience from teacher to student centred. As Cha, Park and Seo (2020) argue, in Korea the benefits of using ICTs in education are wider and broader when taken as an instructional method. In South Africa, the Department of Basic Education consider the integration of ICT into the school system as a way of providing quality education to all (Dzansi and Amedzo, 2014; Padayachee, 2017; *Mwapwele et al., 2019*). The introduction and spread of smart-phones in Sub-

Saharan Africa (SSA) have created new potentials for dealing with educational problems that were in the past considered notorious (Gardner, Joubert, Barrett and Tikly, 2018).

Teachers are the main agents of educational innovation, as Nkonki and Ntlabathi (2016) observe, the functions of teaching and learning are the acquisition of knowledge and skills by individuals to enable them become useful members of society. ICT skills among secondary school teachers and good environment for teaching and learning process should be seen as essential attributes of facilitating timely acquisition, utilization, communication and retrieval of relevant and accurate information. Tanzania cannot be left behind in the development of ICT for teaching and learning activities for teachers in secondary schools (URT, 2007). As Gubbels, Swart and Groen (2020) note ICT can enhance teacher's efficiency and enthusiasm, encourage their planning and co-operation, helps them adopt student-centred teaching strategies, reduce their workload and improve relationship between teachers and students.

The Government of Tanzania acknowledges the importance of ICT in teaching and learning in secondary schools and has thus integrated ICT in the basic education system . The ICT integration was guided by the National ICT Policy for basic education of 2007, which aimed at enhancing and improving the quality of education delivered in primary and secondary schools and in Teachers Training Colleges (URT, 2007). In general, the overall objective of the policy was to build a well-educated and skilled workforce equipped with the application of ICT in every domain of life, with the mission of improving accessibility, equity, quality and significance of basic education as a way improving teaching and learning (URT, 2007). Since the inception of National ICT policy for basic education of 2007, the government in collaboration with different development partners have made numerous efforts in various programs and initiatives to further the ICTs integration process into the country's education system.

In 2009, the MoEVT together with the Global e-Schools and Communities Initiative (GESCI) developed the framework for ICT that would integrate ICT into the teacher education system in Government owned Teachers' Training Colleges

(URT, 2009). In addition, Tanzania beyond Tomorrow (TBT) which is a program under the Ministry of Education and Vocational Training was set to define an e-education program for basic education for 2011-2020. The program was set to improve access, equity and quality in the delivery of secondary education through integration of ICT in teaching and learning. In addition, the Government of Tanzania in collaboration with the Swedish Government through the Swedish International Development Cooperation Agency (SIDA) implemented a project that prepared ICT literate teachers to use ICT as a tool for teaching, learning, management and administration when implementing initiatives such as e-school or e-learning (URT, 2011).

Despite the evident efforts in supporting ICT use in secondary schools in Tanzania, challenges still exist and integration distresses are widespread in secondary education settings (Crallet et al., 2016; Mabiki, 2017; Malekani, 2018). Several studies have been conducted to assess or identify benefits and challenges of ICT integration in secondary schools in Tanzanian; however, comprehensive studies in these respects are lacking in Mtwara Mikindani Municipality. Therefore, in view of the fact that ICTs enhance to a great extent the delivery and acquisition of education, it was deemed imperative to understand the ICT situation in the study area. Therefore, the purpose of this study was to examine the level of ICT use and its benefits to teachers and students in teaching and learning process in Mkindani Municipality. Besides, due to existence of many challenges regarding use of ICTs in secondary schools in Tanzania and beyond, the study explored the limitations of using ICT in secondary schools in Mtwara Mikindani Municipality. Accordingly, this study sought to achieve three specific objectives: to examine the level of ICT tools use in teaching and learning in secondary schools in Mtwara Mikindani municipality, Tanzania; to evaluate the benefits of using ICT tools for teaching and learning in secondary schools in Mtwara Mikindani Municipality, Tanzania and to determine the challenges of using ICT tools for teaching and learning in secondary schools in Mtwara Mikindani Municipality, Tanzania

In general, the reviewed literature indicates that the use and challenges of ICT in secondary schools have been studied in Tanzania and other countries worldwide. However, in Tanzania most of these studies were conducted to examine

effectiveness of ICT usage in teaching and learning process. Very few studies have been conducted to examine benefits of using ICT by secondary teachers in teaching and learning and the critical challenges that hinder secondary teachers from using ICT in teaching and learning process. Thus, this study intends to focus on this knowledge gap.

2.0. Research Methodology

The study was conducted in the selected public and private secondary schools located in Mtwara Mikindani Municipality. The area was chosen because it was easily accessible and the researcher was familiar with the locality. As Singleton and Straits (2010) noted, the suitable study area is one that is related to the researcher's interest, easily accessible and allows the development of immediate rapport with the respondents. Since the policy, programs and initiatives of integrating ICT into education were implemented nationwide, Mtwara Mikindani Municipality had also implemented the policy since 2007. The study area was selected due to its duo urban-rural characters . Hence, the sample which was drawn from Mtwara Mikindani Municipality was a good representative of the schools located in the urban and rural areas of Tanzania. Thus, the research results were generalised to all public secondary schools in the country.

Since the study focused on both public and private secondary schools, the number of secondary schools in Mtwara Mikindani Municipal was 21; whereby 13 secondary schools are owned by public and 8 are private secondary schools. The target population comprised 200 teachers employed in 21 secondary schools. To select the sample this study used probability methods. In total, 120 teachers were selected from secondary schools out of 200 teachers who agreed to participate in the study. The random selection facilitated elimination of bias. This sample size was determined using Yamane (1967) formula, which was used since it is easy as it depends on the size of the population (Teachers) and the accuracy of the estimates, which more than often 5 percent has been used for Ordinary Least Square Estimates (OLS) and Maximum Likelihood Estimates (MLE) (Tejada and Punzala, 2012). The formula is as follows:

$$n = \frac{N}{1 + N(e^2)}$$

Where; n = Sample size

N = Total number of target population (200 teachers in selected secondary schools)

e = Precision (5%)

n= 200/[1 + 200 (0.05)] = 120

n = 120

Statistically, the sample size was large enough to make generalisations about the population basing on the rule of thumb, which suggests the minimum sample size for statistical analysis to be 30 (Saunders et al., 2007). Three Ward Education Officers were purposely selected as key informants because they have in-depth knowledge regarding ICT policy for basic education and its implementation process.

According to Yin (2003), a research design is a plan that guides the researcher collecting, presenting, analysing and interpreting data. This study adopted a descriptive cross-sectional design to get insights from different levels of the selected Local Government Authority. The study considered descriptive cross-sectional design as potential and useful over other designs since it allowed investigating crosscutting issues at diverse levels in a rigorous and broad manner. The use of cross-sectional is based on the fact that data were captured at one point in time. This design also is acknowledged by Saunders et al. (2007) who observe that descriptive design provides an opportunity to describe in detail the phenomenon under investigation. In this case, the study seeks to describe the level of use of ICT and its benefits in teaching and learning in secondary schools. This design was also well thought-out as appropriate for the study because of its ability in exploring the matters and issues when the boundaries between the

observable fact and perspective are not clear evidence, where 'why' and 'how' questions asked and controlled by the researcher are limited (Yin,2003).

The study applied a mixed approach where both qualitative and quantitative data were captured using quantitative and qualitative data collection methods. Data were collected from secondary school teachers and students. Both questionnaire and interview were used to collect information from secondary teachers about the level of ICT use, its benefits and challenges in secondary schools in Tanzania. The survey questionnaire method was employed to collect the qualitative data. This study also gathered secondary data from published government documents such as ICT policy for basic education, reports and guidelines as well as journal articles and internet resources. Quantitative data were cleaned, coded, entered and analysed using Statistical Package for Social Scientist (SPSS) version 21. The descriptive statistics (frequency and percentage) were used to analyse quantitative data. The results were presented as tables and figures.

The study ensured both face validity and content validity. In order to ascertain face validity, the instruments were constructed and passed over to fellow workers for constructive criticism. Thereafter, the data collection instruments were revised according to the provided insights. Moreover, the content validity was achieved through questionnaire pre-testing by using experts' judgements. In this study, fellow academic staff from the Tanzania Institute of Accountancy Mtwara Campus went through the tools and advised accordingly. These experts pointed out the weaknesses and strengths of the instruments and suggested the corrections. Then, the instruments were revised according to their opinions. In case of reliability, the pilot study was conducted to 30 respondents in Mikindani municipal secondary schools. The aim was to test whether the instrument measures what is supposed to measure in a consistent way. According to Kothari (2007) and Tavakol and Dennick (2011), before data collection, the prepared data collection instruments should be pre-tested and pilot-tested to warrant quality of the data to be collected and consequently to ensure validity of the findings.

Qualitative data were analysed using thematic analysis method. The qualitative data were summarised and categorised based on their themes and linked to the research objectives and then reported as quoted narrations. In this study, the reliability of qualitative data was ensured through constant comparison of qualitative and quantitative results to substantiate correctness of data to corroborate with the different sources where data were collected (George and Apler, 2004). In this study, data comparison was initiated during data analysis phase, through the interpretation and reporting of the results. As put forward by Patton (1999), to ensure reliability of qualitative data, comprehensive references to qualitative aspects were made throughout this study.

3.0. Findings and discussion

3.1. Demographic Characteristics of Teachers

In this study, 120 teachers were surveyed in Mikindani Municipality. The results in Table 1 show that among the surveyed teachers 55.0 percent were males and 45.0 percent were females. The results imply that there were male than were female teachers in Mikindani Municipal's secondary schools. This has implication on skills and use of ICT tools since male teachers are comparatively more ready and willing to learn and acquire complex skills such as application of ICT tools for teaching and learning. This finding corroborates with the finding in a study by Mafang'ha (2016). The study findings are also in conformity with the findings in a study by Stromquist et al. (2017) and the World Bank (2019) who reported that there are more male than female teachers in secondary schools in Tanzania. This finding is supported by Asimaki and Vergidis (2013) who posited that teaching profession is a highly gendered profession and has a significant place in the literature on gender and education.

The findings in Table 1 show age distribution of the surveyed teachers in Mikindani Municipal secondary schools. According to age distribution the findings show most (67.5%) of the respondents belonged to the age range of 20-29 years of age, followed by those belonging to 30-39 years of age (25.0%). These findings imply majority of the respondents were middle aged

people who were innovative and flexible to adapt to technological changes. As such, intensive training on ICTs knowledge and skills given to these teachers can bring changes in teaching and learning. According researchers (Schiller, 2003; Kubiatko, 2013; Muriithi, 2017), older teachers are not likely to attend training regarding ICTs use in teaching and learning as young and middle aged teachers do. A similar view is expressed by Technological Acceptance Model (TAM) which was developed by Venkatesh and Davis in 2000. In the model, technology acceptance varies with age. Older individuals are reluctant in accepting new technologies while younger ones are likely to embrace new technology (Venkatesh, Morris, Davis and Davis, 2003).

Table 1: Distribution of Demographic Characteristics of Respondents

Variable/parameter	Measurement	Frequency	Percentage
Sex	Male	66	55.0
	Female	54	45.0
Age	20-29 Years	81	67.5
	30-39 Years	30	25.0
	40-49 Years	09	07.5
Teaching experience	1-3 Years	14	11.6
	4-7 Years	40	33.3
	8-11 Years	21	17.5
	12-15 Years	10	08.3
	+ 15 Years	35	29.2
Education level	Diploma	56	46.6
	Bachelor	60	50.0
	Masters	4	03.3

Additionally, the findings in Table 1 indicate further that most (33.3% teachers had 4-7 years of teaching experience followed by 29.2 percent with more than 15 years of teaching experience. It is argued that a teacher with more than four years' experience is far better in handling teaching activities and is likely to work efficiently than a newly recruited one (Mofuga, 2020). Therefore, majority of teachers had high experience in teaching. The study imply that the surveyed secondary school teachers had enough experience to understand ICT issues in

teaching and learning in secondary school. Thus, given this fact the information which was provided for this study is considered accurate.

Furthermore, the findings in Table 1 show education level of the surveyed teachers' in Mikindani Municipal. The findings indicate that 50.0 percent of the surveyed teachers possessed bachelor degree in education, whilst, 46.6 percent had diploma in education and few (3.3%) had masters' degree in education. The findings imply that majority of secondary schools' teachers in Mikindani municipal have bachelor degree. In the light of these findings, the data given by teachers are considered reliable because teachers are regarded to possess high education qualification and knowledge to understand diverse issues regarding the use of ICT, its challenges and opportunities for education delivery.

3.2 Level of using ICT in teaching and learning

The first research question investigated the level of using ICT for teaching and learning in secondary schools. Today, teachers are encouraged to integrate technology into their personal and professional performance in order to complement the subject matter and to facilitate the teaching process. However, the use of ICT is constrained with a lot of challenges. Table 2 present the findings of level of ICT usage among teachers in secondary schools.

Table 2: Level of Use of ICT in Teaching and Learning in Secondary Schools (n=120)

S/N	Indicator/parameter	Low N(%)	Moderate N(%)	High N(%)
1	Use computers for teaching and learning	9(7.5)	3(2.5)	108(90.0)
2	Use projector for teaching such as to make a presentation	96(80.0)	21(17.5)	3(2.5)
3	Use scanner to scan and distribute materials	22(18.3)	80(66.7)	18(15.0)
4	Use the printer to print notes and tests	8(6.7)	22(18.3)	90(75.0)
5	Use MS word to create documents/ text	11(9.2)	24(20.0)	85(70.8)
6	Use of excel	27(22.5)	77(64.2)	16(13.3)
7	Use PowerPoint for presentation	41(34.2)	64(53.3)	15(12.5)
8	Use internet for forum discussions	79(65.8)	35(29.2)	6(5.0)
9	Use internet to share information	12(10.0)	43(35.8)	65(54.2)
10	Use internet to search for educational materials to develop myself professionally	5(4.2)	16(13.3)	99(82.5)

Secondary school teachers were asked to rank the level they were using ICT tools for teaching and learning process. The findings in Table 2 show that computers were extensively used for teaching and learning by secondary school teachers. The findings indicate that 90.0 percent of the surveyed secondary school teachers reported to use computers for teaching and learning followed by the use of internet to search for educational materials to develop themselves professionally (82.5%). Other extensively uses of ICT tools in teaching and learning included the use of printers to print notes and tests (75.0%) and the use of MS word to create documents or text (70.8%). Further, during in-depth interview with the District Education Officer and Ward Education Officer, revealed that computers were used for preparing teaching notes and examinations. In addition, computers were used by teachers to search for materials used to prepare students notes and for own

learning. According to key informants most of the teachers in secondary schools possess laptops and use them very often to prepare notes and examinations for their subjects. During in-depth interview, key informants confirmed the findings regarding the use of ICT for printing purposes . The KIs acknowledged that teachers use printers extensively to print notes, other teaching materials and students' tests and examinations, which are prepared using computers . The study findings revealed further that teachers extensively use MS-word and to a lesser extent, MS-excel and MS-PowerPoint in preparing notes and other learning materials. In substantiating this, a key informant had this to say, which is directed quoted and literally translated as follows.

> *Computers had been a necessary device or tool in everyday work life of secondary school teachers because it can be applied for various functions in the process of teaching and learning. It can be used as an instruction media, a source of materials, an equipment to prepare and organise teaching and learning materials and as a pedagogical tool. As a result the use of computers is high among secondary school teachers... Most teachers own laptops and use them for educational purposes... these include preparing teaching notes, teaching aids, worked examples, test and examinations... scanners and projectors are not frequently used because very few teachers possess the expertise*(Participant Number 1).

In addition, one of the Ward Education Officers interviewed in this study also said the following as directly quoted and literally translate;

> "... *computers are highly used by teachers for instructional activities... to print the notes and exams teachers use printers very frequently... in case of software which is highly used is MS-word followed by excel or spreadsheet*..." (Participant Number 3)

These findings imply that computers are not used in the classroom to display materials to students as pedagogy tools but are used to support teachers in their administrative and daily jobs. The finding corroborate with the finding in other studies (i.e., Kira and Mahumbwe, 2015;Kihoza, 2016) who found that secondary

school teachers in Tanzania still depend on chalk, blackboard and books regardless of the prospects presented by the emergence of ICT. However, ICT in education is not used to replace the existing resources but it is meant to complement these resources. This finding is supported by findings in studies by Capper (2003) and Park and Weng (2020) who revealed that the use of ICT changes the old teaching methods of chalk and board to a more learner-oriented approach. ICTs enables students to learn independently while at home by accessing materials from the internet. Google and other search engines can provide unlimited information and knowledge regarding secondary school subjects and guide students in acquiring knowledge. However, when teachers and ICTs are present, the impacts of both are amplified and students' learning is enhanced.

Considering the use of scanner to scan and distribute materials, 66.6 percent of secondary school teachers indicated to have used the scanner moderately. The moderate use of ICTs was found moderate in using excel to create spreadsheet for management or teaching purposes(64.2%). the findings also show that the use of ICT for power point presentation, was low (34.2%) to moderate (53.3%). Regarding the use of internet to share information, that the findings revealed that, ICTs were used moderately (35.8%) to extensively (54.2%). During in-depth interview, one of the Ward Education Officers the following directly quoted and literally translated extract,

> *... scanners are not widely used by teachers for teaching in classrooms or laboratories, and even most schools do not have scanners, they instead possess printers for printing subject notes, tests and examinations... the same is the case for software such as excel and PowerPoint as well as the internet for some purposes... The internet is extensively used for searching educational materials and sharing information with students and colleagues via social media such as WhatsApp and Facebook. Teachers and students have currently been in touch via these tools and the delivery of education has now been revolutionised. In general, I can say, the ICT usage for teaching is lower than might be the case with for learning"* (Participant Number 2).

The study findings reveal further that teachers were using ICT for teaching and learning to a moderate extent, leading to moderate level of ICT application in teaching and learning in secondary schools. This implies that most of the teachers are still using old methods of chalk and talk, making them lag behind the new world of ICT. The study findings conform to the findings in a study by Malekani (2018) who found that ICTs and the available facilities in secondary schools are not adequately utilised for the intended purposes. The ICTs have only been extensively used for the preparation of notes, teaching and learning resources and examinations but not as a pedagogical tool. According to Ndibalema (2014), in order to realise the potentials of ICT in education, the ICT policy for basic education stipulates that ICT tools must be used as pedagogical tools.

3.3. Benefits of Using ICT in Teaching and Learning

Successful use of ICT for teaching and learning purposes depends on the knowledge of teachers, their confidence and competence in using ICTs. Thus, teachers need to learn how to use technology and to learn how to apply the technology for teaching and learning, and to know which technologies will most effectively meet children's skills, abilities and needs. Doing so will make the use of ICT by students beneficial. The findings in Table 3 present the frequency distribution of ICT benefits for teaching and learning in secondary schools.

Table 3: Benefits of Using ICT in Teaching and Learning Process (n=120)

S/N	Benefits of ICT	**Frequency**	**Percentage**
1	ICT facilitate and make the teaching and learning process easier	105	87.5
2	ICT widens access to education resources	88	73.3
3	Using ICT enhances learners understanding	99	82.5
4	ICT facilitate learners to work collaboratively	77	64.2
5	ICT in teaching area makes learners more engaged to the lesson.	73	60.8
6	ICT improves education delivery	107	89.2
7	ICT use increases access to information and knowledge	103	85.8
8	I don't know	7	5.8

The study findings revealed that the role to improve education delivery followed by the function of facilitating teaching and learning process as the highly regarded benefit of ICTs, while the role of ICTs to engage learners in learning process as the least regarded. The findings in Table 3, indicate that majority 107 (89.2%) of secondary school teachers said that ICT improves education delivery. This implies that ICTs are very crucial for effective delivery of education and have huge potential of improving education performance in the study area. The findings conform with the findings in a study by Brás et al. (2014) who reported that ICTs can make great contribution to effective teaching and learning by expanding access to educational materials, enhancing the quality of teaching and improving the quality of learning.

These findings corroborate with the findings in a study by Pongsakdi et al., (2021) who posited that ICT offer more useful and innovative teaching and learning and develop intellectual and ingenious prospective of the students in the current information society. The findings are in line with the findings in other studies (Jamieson-Proctor et al., 2013; Hussain et al., 2017; and Lei et al., 2021) who noted that ICTs can make great contribution to various aspects of education development and effective teaching and learning through promoting efficiency, expanding access, enhancing the quality of teaching and improving the quality of learning. Collaboratively, Nordic (2006) and Wong et al. (2016) emphasis on the contribution of ICT on students' creativity, motivation and engagement; moreover ICT increase students' confidence and making learning more enjoyable. It is through the use of ICT that innovation and creativity is promoted in teaching and learning.

Furthermore, 87.5 percent of the respondents agreed that ICT facilitate and make the teaching and learning process easier. The finding implies that ICTs are very crucial for effective teaching and learning in the study area. This finding corroborates with the findings of other studies (i.e., Wong et al., 2016) who found that ICT can play a vital role in supporting teaching and learning in the classroom and may facilitate clearer thinking, and increase student motivation. It is through the use of ICT that innovation and creativity is promoted in teaching and learning. Moreover, similar findings are reported in a study by Khan et al. (2012) who reveal

that ICT for education is very important in this digital era. Similar findings are reported in a study by Amuko et al. (2015) and Ngeze (2017) who revealed that ICTs are essential in teaching and learning, in that they influence the subjects taught and enhance students' learning.

In addition, the findings show that 85.8 percent of secondary teachers agreed that ICTs are useful for increasing access and sharing information and knowledge during teaching and learning process. This implies that the use of ICTs in teaching and learning can add knowledge and skills of learners. About 82.5 percent of teachers reported similar findings that ICTs enhance learners' understanding and hence improve academic performance. Thus, this signifies that teachers' perception towards the use ICT was positive. The finding is in line with the findings in a study by Alkahtani (2016) who revealed that the internet plays the most important role in the dissemination of information and knowledge in the global. Apart from information sharing, Ngeze (2017) reported that internet connection offers more learner centred instruction and acts as a partner and a tutor for individualised learning among students in the absence of teachers.

Moreover, the findings from an in-depth interview with key informants revealed that the most important benefits of ICT in teaching and learning were to facilitate and make the teaching and learning process easier, to improve education delivery and to increase access to information and knowledge. Key informants informed the study that these core benefits derives a lot of other potentials of ICT in education. In terms of pedagogy, ICT is changing the way students learn and teachers teach. Teaching using ICT facilitates the learning process in a positive way and makes students more actively engaged in learning. In this respect, one of the key informants said the following directly quoted and literary translated extract,

> "... *ICTs facilitates the teaching process, though the use is still low but there is a promising future as teachers are becoming more aware of the importance of ICTs in teaching and learning... students also are becoming more inclined to use of ICTs for learning*... (Participant number 2)"

According to the study findings, ICT is an indispensable tool in the modern teaching and learning era as it prepares learners to survive in the world of rapid technological change where information is the most valuable product and resource. ICT in schools promotes cultural exchange, develop communication skills among learners and assist them with studies. ICT allows learners to apply the concept or understand new situations, to analyse ideas by organising them and manipulating them and to learn how to evaluate and solve problems. Therefore, keeping in mind the reality that many secondary schools leavers do not get access to further education, the attainment of ICT skills when in school is essential in meeting employments requirements in the current information economy. ICT integration in secondary schools is therefore essential for ensuring that school leavers enhance their employability. The idea is that ICT skills create a citizenry of lifelong learners who can adapt to the global economy. It is further argued that if the education system fails to enable people to do this it is redundant.

3.4. Challenges and Critical Challenges that Hinder the use of ICT in Teaching and Learning

3.4.1 Challenges hindering secondary teachers from using ICT

Availability of ICT infrastructure is the first step towards the adoption and use of technology in schools. In addition, teachers' ICT skills and access to professional development is critical in the implementation of ICT in schools. The findings from Table 4 indicate the challenges constraining secondary school teachers from using ICT for teaching and learning.

Table 4: Secondary Teachers and Challenges Hinder Implementation of ICT (n=120)

S/N	Challenges of using ICT	Frequency	Percentage (%)
1	Inadequate ICT infrastructure	117	97.5
2	Lack of teachers' training	63	52.5
3	Lack of standby power	20	16.6
4	Personal attitudes about ICT	28	23.3
5	Large number of students with few ICT facilities	42	35.0
6	Lack of teachers' motivation	88	73.3
7	Lack of technical support	72	60.0
8	Unreliable internet connection	82	68.3
9	Lack of ICT skills among teachers	88	73.3

The findings in Table 4 show the following as challenges hindering effective integration of ICT in secondary schools for teaching and learning purposes; inadequate ICT infrastructure (97.5%), particularly PowerPoint, projectors, software, computers, scanners and printers. The finding implies that lack of ICTs infrastructure is the main obstacle in implementation and use of ICT facilities in the secondary schools in the study area. The study findings corroborate with the findings in other studies (i.e., Kihoza, 2016; Kihoza et al., 2016; Crallet et al., 2016; Mabiki, 2017;Burns et al., 2019). These tools according to the in-depth interview with key informants are largely used for writing notes, printing notes, sharing notes, preparing tests and examinations with exceedingly little application in classroom presentation of materials to students.

The findings in Table 4 indicate further, that there is lack of teachers' trainings in the use of ICT for teaching and learning (52.5%) thus compromising acquisition of ICTs skills and knowledge among teachers (73.3%) and as a result lowering teachers' motivation against the use of ICTs for teaching and learning (73.3%). . The study findings are consistent with the findings in a study by Alkahtani (2016) who found that teachers have poor training opportunities to develop the necessary ICT skills. According to Alkahtani (Ibid)in Saudi Arabia, the ICT training programs were considered as too theoretical to provide basic computer literacy skills, which would have helped teachers use ICTs as a teaching and learning tool. There is therefore a need of providing appropriate training, especially to teachers on the on-going basis. This training should focus on the operation of the ICT equipment and on the curriculum in terms of content and delivery methods.

Moreover, the findings in Table 4 indicate other moderate challenges as inadequate or lack of technical support (60.0%) in cases of tools breakdown or disruption of internet connectivity. This finding implies that when ICTs equipment and or infrastructure malfunctioned or damaged, it takes quite some time before being repaired. As a result, secondary schools fail to use ICTs efficiently for teaching and learning activities.. Likewise, Crallet et al (2016) also found that ICT integration in Tanzania is constrained by shortage and breakdown of equipment. This is due to among others, the lack of financial resources to acquire new equipment or repair the existing ones once they break. The equipment must be available and must be in good working order in enable ICTs be effectively integrated in education.

In addition, during an in-depth interview it was discovered that one of the most perceived challenges of using ICT in secondary schools is lack of teachers' support from school administration, the municipal, the ministry or any other government body. Easy access to technical support for equipment maintenance is essential in supporting both teachers and students. A well-functioning, maintained and effectively used ICT equipment facilitate a shift from the knowledge transmission model of learning to one of inquiry learning. Therefore, teachers' support from school management, municipal and the ministry or any other government body is a major challenge against the application of ICT in secondary schools in Mtwara Mikindani Municipality. This situation is attributed to low level of funding and training. Schools should be well funded and teachers well-trained on ICT usage; moreover, the school management should always make arrangements for ICT practices and investments on ICT equipment.

Furthermore, the findings in Table 4 revealed that unreliability of internet connectivity owing to small bandwidth also is another challenge facing secondary school limiting their use of ICTs for teaching and learning. This challenge was acknowledged by 68.3 percent of the surveyed teachers in the study areas.. Thus, it can be argued that deliberate efforts of education stakeholders and the government to invest substantially in Internet infrastructure as one of the most important resources in learning Similar finding are reported by Kihoza (2016) who revealed that unreliable internet connection is one of the major hindrances of effective integration of ICTs on the delivery of education. According to Alkahtani

(2017) and Mwapwele et al. (2019), internet connection is very crucial for ICTs to work effectively in teaching and learning process. Without internet connectivity integration of ICTs in teaching becomes difficult. .

Moreover, the findings in Table 4 show that lack of standby power (16.6%), personal attitudes and perceptions towards ICTs (23.3%), large class sizes as opposed to ICT facilities (35.0%) compromised the integration of ICT in teaching and learning in secondary schools. These findings corroborate with the fundings from by key informants who revealed that almost all schools are connected to national power grid, which is a reliable source of electric power in the country despite the unpredictable power cuts which occur frequently. Therefore, standby generators are not necessary since they involve a lot of money to acquire and run them in terms of fuel. One key informant had this to say;

> *"I humbly want to say that clouding in the classrooms is common in our schools for decades now. If we take it as the hindrance factor for poor ICTs integration in education we will be making a grave mistake not to look into the real problems... I think we need to think why our plans always end in vain."*

3.4.2. Critical challenges hindering secondary teachers from using ICT

The findings in Table 4 show at least 50 percent of critical challenge affecting secondary school teachers in the use of ICT for teaching and learning process in Tanzania. Accordingly, poor/inadequate ICT infrastructure such as projectors, software, computers, scanners and printers (97.5%) are among the critical challenges. In addition, lack of ICT skills and knowledge (73.3%) and lack of teachers' training in the use of ICT for teaching and learning (52.5%) were found to be critical challenges. Other critical challenges include inadequate or lack of technical support (60.0%), lack of teacher motivation (73.3%) and unreliable internet connection (68.3%)..

Other challenges reported in the study including lack of standby power, personal attitudes and perceptions towards the technology, large class sizes as compared to ICT facilities were found insignificant in affecting the use of ICT among secondary school teachers for teaching and learning process in Tanzania. These findings confirm the earlier findings (see Malekani, 2018) indicating that lack of teachers' training and inadequate ICT tools as the most constraining challenges against the integration of ICT in teaching and learning in Tanzanian secondary schools. In addition, as Crallet et al. (2016) observe, teachers' lack of support in using ICT is a major challenge against smooth adoption of computers in teaching and learning in secondary schools in Tanzania.

Moreover, Rumanyika and Mashenene (2015), indicate that poor ICT infrastructure (100%) and limited access to ICT hardware and software (61.3%) are the key factors that affect the use of ICT in teaching and learning for Higher learning institutions in Tanzania. These problems have also been reported by many researchers in the Tanzanian context (Yonazi, 2012; Nzilano, 2015; Kafyulilo, 2015; Kihoza, 2016; Daudi and Nzilano, 2019). Thus, provision or increase of ICT infrastructure, technical support and teachers' training in the use of ICT for teaching and learning will accelerate ICT integration in Tanzania secondary schools and thus improving the teaching and learning activities.

4.0. Conclusion and Recommendations

The study finding of this have shown that Tanzania secondary schools are still lagging behind in the application of ICT in the teaching and learning process. There is scarcity of ICT facilities in schools due to low ability of using ICT among teachers as a result of poor training and lack of support from the school management and higher levels of the government. Regardless of the benefits of using ICT in secondary schools there is still a great number of obstacles against the effective integration of ICT in secondary schools' teaching and learning process. Among others, the critical challenges of ICTs integration in education in the study area include poor/inadequate ICT infrastructure such as projectors, software, computers, scanners and printers, lack of ICT skills and knowledge,

lack of teachers' training in the use of ICTs, lack of technical support and lack of teacher motivation as well as unreliable internet connectivity.

Based on the findings of this study, it is recommended that the government should increase funding for the entire educational system focusing on acquisition of ICTs tools and infrastructures so as to properly integrate ICTs in the education delivery and raise its usage in teaching and learning. This will promote ICT usage in schools to a new domain. Furthermore, the study recommends that, policy makers should make mandatory for schools to have computer laboratory; and that in every five secondary school or in one division, there must be a specialised technician for providing technical support to teachers; and who should be appointed or recruited by district councils. In addition, it is recommended that teachers should be open minded and learn new and advanced technologies for teaching and learning as we move forwards further and deeper into the world of science and technology. This is because ICT can provide a lot of benefits though the delivery of quality secondary school education.

Moreover, this study recommends that the government should identify priorities and commit resources in improving ICT infrastructure, providing technical support and equip teachers with effective ICT skills and knowledge for teaching and learning. To do this the study recommends that the government should enforce acquisition of ICT skills and programs for teachers. Besides, due to the limited resource of the nation, this study recommends for decision makers and other education practitioners to put much efforts in tackling the most critical challenges which will be fruitful; instead, of dealing with a multitude of challenges at a time. Lastly, but not least this study recommends to the government to allow secondary schools use their own sources of fund to equip their computer laboratories with up to date ICTs equipment and infrastructure.

References

Abdulwahed, S., Ismail, A., Almekhlafi, A. G. and Al-mekhlafy, M. H. (2010). Teachers' perceptions of the use of technology in teaching languages in United Arab Emirates' schools. *International Journal for Research in Education*, 27.

Adeosun, O. (2010). Quality basic education development in Nigeria: Imperative for use of ICT. *Journal of International Cooperation in Education*, 13(2), pp. 193-211.

Alkahtani ,A (2016) The challenges facing participants integration of ICT in Teaching Saudi secondary schools. *Innovative journal*, 1(2), pp. 39-40.

Amuko, S., Miheso, M. and 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): pp. 1-6.

Balanskat, A., Blamire, R., and Kefala, S. (2006). A review of studies of ICT impact on schools in Europe. Available at: [http: // unpan1 .un .org / intradoc /groups /public / documents/unpan/unpan037334.pdf] (accessed 29/01/2021).

Baluku, E. and Kasujja, J.P. (2020). Ict Usage in Teaching and its' Influence on Students' academic Performance in Uganda Certificate of Education (UCE) in Kasese District. *International Journal of Education and Research*, Vol. 8 No. 2, pp. 21-40

Barakabitze, A.A., Lazaro, A. W. A, Ainea, N., Mkwizu, M.H. Maziku, H. Matofali, A.X. Iddi, A. and Sanga, C. (2019). Transforming African Education Systems in Science, Technology, Engineering, and Mathematics (STEM) Using ICTs: Challenges and Opportunities. *Hindawi Education Research International*, Volume 2019, Article ID 6946809, 29 pages.

Berhane A. T. (2012). Understanding the Importance, Benefits and Barriers of ICT on Teaching and Learning in East African Countries. *International Journal for e-Learning Security* (IJeLS), 2(1), 3/4.

Brás, P., Miranda, G. L., and Marôco, J. (2014). Teachers and Technology: A Complicated Relationship. *GSTF International Journal on Education* (JEd), 2(1), pp. 56–65.

Buabeng-Andoh, C. (2012). An Exploration of Teachers' Skills, Perceptions and Practices of ICT in Teaching and Learning in the Ghanaian Second-Cycle Schools. Contemporary Educational Technology, 3(1). Available at:[Http://Search.Ebscohost.Com].(accessed 25/01/2021).

Buabeng-Andoh, C. (2012). Factors Influencing Teachers' Adoption and Integration of Information and Communication Technology into Teaching: A Review of the Literature. *International Journal of Education and Development using Information and Communication Technology* (IJEDICT), 8(1), pp. 136-155.

Burns, M., Santally, M.I., Halkhoree, R., Roopesh, K., Sungkur, Juggurnath, B. and Rajabalee, Y.B. (2019). Information and Communications Technologies and Secondary Education in Sub-Saharan Africa: Policies, Practices, Trends and Recommendations. Mastercard Foundation.

Cha, H., Park, T. and Seo, J. (2020). What Should Be Considered when Developing ICT-Integrated Classroom Models for a Developing Country? Sustainability, 12, 2967; doi:10.3390/su12072967

Chirwa (2018), Access and use of internet in teaching and learning at two selected teachers' colleges in Tanzania, T*he International Journal of Education and Development using Information and Communication Technology*, 14(2), pp. 4-16.

Crallet, V., Ismail, A. and Manyilizu, M. (2016). Support of ICT use in Tanzania Secondary SchoolsThe Case of Dodoma Municipality. *International Journal of Computer Applications,* 134(16)

Daudi, Y. and Nzilano, J.L. (2019).ICT integration in teaching and learning: perceptions and practices of secondary school students in Tanzania. University of Dar es Salaam Library Journal, 14(2), pp. 38-52.

David, K.M., Tanui, E. and Oruta, F. (2019). The Role of School Administration in Implementation of ICT in Human Resources Administration in Public Secondary Schools. *Journal of Advances in Education and Philosophy*, 3(10): 364-371

Dzansi, D.Y. and Amedzo, K. (2014). Integrating ICT into Rural South African Schools: Possible Solutions for Challenges. *International Journal of Education Science*, 6(2), pp. 341-348

E-Learning Nordic, (2006). Impact of ICT on Education. Capenhagen,Denmark: Romboll Management. Available at: [http://www .oph.fi./ download /47637_elerning _Nordic _English. pdf] (accessed 20/1/2021).

Fullan, M. (2007). The New Meaning of Educational Change, 4th ed.; Teachers College Press: New York, NY, USA, 2007.

Gardner, V., Joubert, M., Barrett, A.M. and Tikly, L. (2018). *Approaches to Strengthening Secondary STEM and ICT Education in Sub-Saharan Africa*. Bristol Working Papers in Education, 10(1).

George, M. & Apter, A.J. (2004). *Gaining Insight into Patients' Beliefs using Qualitative Research Methodologies*. Curr Opin Allergy Clin Immunol. 2004;4:185–9.

Ghavifekr, S., and Rosdy, W.A.W. (2015). Teaching and learning with technology: Effectiveness of ICT integration in schools. Int. J. Res. Educ. Sci., 1, pp. 175–191.

Ghavifekr, S., Kunjappan, T., Ramasamy, L. and Anthony, A. (2016). Teaching and Learning with ICT Tools: Issues and Challenges from Teachers' Perceptions. *Malaysian Online Journal of Educational Technology*, v4 n2 p38-57 2016

Gubbels, J., Swart, N.M. & Groen, M.A. (2020). Everything in moderation: ICT and reading performance of Dutch 15-year-olds. Large-scale Assess Educ **8,** 1. https://doi.org/10.1186/s40536-020-0079-0

Hennessey, S. (2010) *Developing the use of Information and Communication Technology to enhance teaching and learning in East African schools: Review of the Literature*. Aga Khan University: Nairobi.

Humbhi, S. and Tareen, S. (2021). Measuring the Impact of ICT on Students' Academic Performances: Evidence from Higher Educational Institutions of the Remote Areas of Pakistan. *Library Philosophy and Practice* (e-journal). 5476.

Hussain, I., Suleman, Q., ud Din, N. and Shafique, F. (2017). Effects of Information and Communication Technology (ICT) on Students' Academic Achievement and Retention in Chemistry at Secondary Level. *Journal of Education and Educational Development*, 4(1), pp. 73-93

Jamieson-Proctor, R., Albion, P., Finger, G., Cavanagh, R., Fitzgerald, R., Bond, T., and Grimbeek, P. (2013). Development of the TTF TPACK Survey Instrument. Aust. Edu. Comp, 27(1), pp. 26–35.

Kafyulilo, C.A. (2015). ICT Use in Science and Mathematics Teacher Education in Tanzania. Developing Technological Pedagogical Content Knowledge. *Australian Journal of Educational Technology*, 31(4), pp 381-399.

Kazoka, R., & William, F. (2016). Secondary School Teachers ' Knowledge and Practice towards the Use of ICT 1. Semantic Scholar

Khan, M., Hossain, S., Hasan, M., and Clement, C. K. (2012). Barriers to the Introduction of ICT into Education in Developing Countries: The Example of Bangladesh. *International Journal of Instruction*, 5(2).

Kihoza, P.D, Zlotnikova, I., Bada, J. and Kalegele, K. (2016). Classroom ICT integration in Tanzania: Opportunities and challenges from the perspectives of TPACK and SAMR models. *International Journal of Education and*

Development using Information and Communication Technology (IJEDICT), 12(1), pp. 107-128.

Kihoza, P.D. (2016). A framework for online resources and e-learning implementation (OREI) in Tanzania secondary schools. A Dissertation Submitted for Degree of Doctor of Philosophy in Information and Communication Science and Engineering of the Nelson Mandela African Institution of Science and Technology

Kira, E. and Mahumbwe, N. (2015). Utilization of the internet facility in Dar es Salaam secondary schools in Tanzania. *Global journal of advanced research*, 2(9), pp. 1453-1464.

Kothari, C.R. (2007). *Research Methodology, Methods and Techniques*, New Heshi: Wishwa Prakashan, New Delhi.

Laaria, M. (2013) Leadership challenges in the implementation of ICT in public secondary schools, Kenya, *Journal of Education and Learning* 2 (1), pp. 32-43.

Lei, H., Xiong, Y., Chiu, M.M., Zhang, J. and Cai, Z. (2021). The relationship between ICT literacy and academic achievement among students: A meta-analysis. Children and Youth Services Review, 127(106123).

Mabiki, A.P. (2017). The influences of school management on the implementation of ICT curriculum in community secondary schools in Kibaha District, Tanzania. A Masters dissertation submitted at the Open University of Tanzania

Mafang'ha, M. (2016). Teachers' experience on the use of ICT to facilitate teaching: A case of ilala district secondary schools. A Masters thesis, The Open University of Tanzania.

Malekani, A.A. (2018). Access to, Use and Challenges of ICTs in Secondary Schools in Tanzania: A study of Selected Secondary Schools in Morogoro Municipality. *Journal of Information and Knowledge Management*, 9(2), pp. 44 – 57.

Mlunghisi, D. M. and Dominique, E. U. (2014). The Challenges Facing the Integration of ICT in Teaching and Learning Activities in South African Rural Secondary Schools, *Mediterranean Journal of Social Sciences* MCSER Publishing, Rome-Italy, 5(20).

Mofuga, C.S. (2020). Influence of leadership attributes of head of schools on the student's academic performance in selected secondary schools in Tanzania: A case of Mbulu district. PhD Thesis submitted at Open University of Tanzania

Mtega, W. P., Bernard, R., Msungu, A. C., and Sanare, R. (2012). Using mobile phones for teaching and learning purposes in higher learning institutions: The case of Sokoine University of Agriculture in Tanzania. In Proceedings and report of the 15th UbuntuNet alliance Annual Conferenc at Dar es salaam. Available at:[https :// repository .ubuntunet.net/bitstream/handle/10.20374/130/ mtegaw-presentation .pdf? sequence =2 andisAllowed=y] (accessed 24/12/2021).

Mubashrah, J., Shaziah, J. and Khawila, R. (2017). An Assessment of Secondary School Teachers' Performance and Skills in ICTs by National Professional Standards Pakistan, Haripur. *Journal of Educational Research*, 1(1).

Muriithi, M.J. (2017). Factors Affecting Implementation of ICT Education in Public Primary Schools in Kajiado North Sub-County Kenya. A Masters' Dissertation Submitted at University of Nairobi.

Mwiluli, P.M. (2018). Influence of ICT Integration on Academic Performance in Public Secondary Schools in Kenya. A Case of Makueni County. A Research Project Report Submitted in Partial Fulfillment of the Requirement for the Award of the Degree of Masters of Arts in Project Planning and Management of the University of Nairobi.

Ndibalema, P. (2014). Teachers Attitudes towards the Use of ICT as a Pedagogical Tool in Secondary Schools in Tanzania: The Case of Kondoa District. *International Journal of Education and Research*, 2(1).

Ngeze, L. V. (2017). CT Integration in Teaching and Learning in Secondary Schools in Tanzania: Readiness and Way Forward. *International Journal of Information and Education Technology*, (7) 6.

Nihuka, K. A., and Voogt, J. (2012). Collaborative e-learning course design: Impacts on instructors in the Open University of Tanzania. *Australasian Journal of Educational Technology*, 28(2), pp. 232-248.

Nzilano, J. L. (2015). Influences and Outcomes of Social Constructivist Curriculum Implementation on Tutors' Beliefs and Practices in Teacher Education Colleges in Tanzania (Doctoral thesis). Victoria University of Wellington, Wellington, New Zealand.

Papaioannon, P and Charalambous, K (2011). Principals' attitudes towards ICT and their perceptions about the factors that facilitate or inhibit ICT integration in primary schools of Cyprus, *journal of Information Technology Education* 10(1), pp. 349-369

Patton, M.Q. (1999). Enhancing the Quality and Credibility of Qualitative Analysis. Health Services Resources, 34:1189–208.

Peeraer, J., and Van Petegem, P. (2011). ICT in Teacher Education in An Emerging Developing Country: Vietnam's Baseline Situation at the Start of "The Year of ICT." Computers and Education, 56(4), pp. 974–982.

Pongsakdi, N., Kortelainen, A. & Veermans, M. (2021). The impact of digital pedagogy training on in-service teachers' attitudes towards digital technologies. Educ Inf Technol, 26, 5041–5054 https://doi.org/10.1007/s10639-021-10439-w

Rumanyika, J.D, and Mashenene, R. G. (2015). Challenges for Teaching and Learning Information and Communication Technology Courses in Higher Learning Institutions in Tanzania: A Review. Information and Knowledge Management, 5(2).

Saunders, M. N. K., Lewis, P., and Thornhill, A. (2007). Research Methods for Business Students. Harlow, England Financial Times/Prentice Hall.

Siddiquah, A. and Salim, Z. (2017). The ICT Facilities, Skills, Usage, and the Problems Faced by the Students of Higher Education. EURASIA *Journal of Mathematics Science and Technology Education*, 13(8), pp. 4987-4994.

Singleton, R. and Straits, B. (2010). Approaches to Social Research.5thedn. New York : Oxford University Press.

Swarts, P., and Wachira, E. M. (2010). Tanzania: ICT in education situational analysis. Dar es salaam: Ministry of Education and Vocational Training.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, 2, 53-55.

Tedla, B. A (2012). Understanding the Importance, Impacts and Barriers of ICT on Teaching and Learning in East African Countries. *International Journal for e-Learning Security* (IJeLS), 2 (3/4), pp. 356-400.

Tejada, J. J. and Punzalan, J. R. B. (2012). On the Misuse of Slovin's Formula. The Philippine Statistician, 61(1), 129-136.

Teo, T. (2006). Attitudes towards computer: A study of post-secondary students in Singapore. Journal of Technology and Teacher Education, 14(1).

Tomczyk, Ł. & Oyelere, S. S. (2020). ICT for learning and inclusion in Latin America and Europe. Cracow: Pedagogical University of Cracow. DOI 10.24917/9788395373732

Ullah, M.A., Alam, M.M., Shan-A-Alahi, A., Rahman, M.M., Masum, A.K.M. and Akter, N. (2018). Impact of ICT on Students' Academic Performance: Applying Association Rule Mining and Structured Equation Modeling. (IJACSA). International Journal of Advanced Computer Science and Applications, 10(8), Pp. 387-393

UNESCO, (2009). Guide to measuring information and communication technologies in education. Montreal: UNESCO Institute for Statistics.

United Republic of Tanzania (2007). Information and communication technology (ICT) policy for basic education. Available at: [https: //www .moe .go. tz / en / publications /send /27 –policy –sera / 219 –ICT –policy – for – basic -education-2007.html] (accessed 2/02/2021).

United Republic of Tanzania (2009). *Framework for ICT Use in Teacher Professional Development in Tanzania*. Available at: [https: //www .moe .go. tz / en / publications /send /27 –policy –sera / 219 –ICT –policy – for – basic -education-2007.html] (accessed 2/02/2021).

United Republic of Tanzania (2011). Tanzania beyond Tomorrow (TBT). Available at: [https: //www .moe .go. tz / en / publications /send /27 –policy –sera / 219 –ICT –policy – for – basic -education-2007.html] (accessed 2/02/2021).

United Republic of Tanzania (2003), National Information and Communication Technology Policy. Availableat: [http : // www . moe . go.tz/sw/ machapisho/category/27-policy-sera.html] (accessed 27 /01 / 2 0 21).

Venkatesh Y., M.G. Morris, G.B. Davis and Davis F.D. (2003). "User acceptance of information technology: toward a unified view". MIS Quarterly 27(3), 425-78.

Venkatesh, V.. Davis, F.D. (2000) A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. Management Science, 46(2), pp. 186-204. http://dx.doi.org/10.1287/ mnsc.46.2.186.11926

Wong, A. F. L., Quek, C. L., Divaharan, S. and Williams, M. D. (2016). Singapore Students' and teachers' perceptions of computer-supported Project Work classroom learning environments. *Journal of Research on Technology in Education*, 38 (4), pp. 449-479.

Wordu, H. and Chinda, K. (2020). Personnel and Finance Related Constraints Facing the Application of Information and Communication Technology (ICT) in the Administration of Secondary Schools in Rivers East

Senatorial District. Research *Journal of Mass Communication and Information Technology*, 6(1), pp. 42-52.

Yamane, T. (1967). Statistics, An introductory Analysis 2nd Ed. New York: Harper and Row

Yin, R. K. (2003). *Case Study Research: Design and Methods* (3rd ed.). Thousand Oaks, CA: Sage.

Yonazi, J.J. (2012). Exploring Facilitators and Challenges Facing ICT4D in Tanzania. *Journal of e-Government Studies and Best Practices*, 2012 (703073): pp. 1-16.

Youssef, A. B., and Dahmani, M. (2008). The impact of ICT on student performance in higher education: Direct effects, indirect effects and organisational change. RUSC. Universities and Knowledge Society Journal, 5(1), pp. 13.