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# Exploring the Opportunities for Integrating New Digital Technologies in Tanzania's Higher Education Classrooms

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**Abstract.** The growth of information and communication technology (ICT) have influenced the method of delivering content in higher learning institutions world wide. As many Sub-Sahara African countries, however, Tanzania still struggles with the use of ICT in teaching and learning due to the technological challenges, such as the lack of power/energy (Bitew, 2008; Masters, 2004). To better understand the utilization of ICT in Tanzania, this study applies qualitative techniques to explore the opportunities of integrating new digital technologies by teachers and students. Both students and instructors in Tanzanian higher learning institutions were interviewed, and the data were analyzed using open coding techniques in MAXQDA 11. Four themes were generated: (1) Common and utilized digital tools, (2) technologies integrated in learning and teaching, (3) reasons learners/instructors use some digital tools in learning, and (4) recommended digital tools for learning and teaching. In all, the present study provides useful suggestions for ICT integration in Tanzanian classrooms and Africa at large.

**Keywords:** Digital technologies; Emerging technologies; Teaching and Learning; Tanzania; Higher learning.

## Introduction

Studies have indicated that a paradigm shift has been experienced in the academic practices in the past few years, particularly within the last decade (Siemens & Titternberger, 2009). This paradigm shift has been caused by the growth of information and communication technology (ICT), especially the use of Internet. In this paradigm shift, technology has changed the traditional teaching and learning in higher education, including the methods of course delivering, assessment, and other classroom activities.

Due to rapid technological innovations, learners are digitally connected, and have become hyperkinetic, adventurous, impatient, and highly collaborative (Oblinger, 2004). These learners prefer learning and teaching to be funny, enjoyable, self-guided, and motivating, as well as the learning resources to be

easily accessible and less expensive (Siemens & Titternberger, 2009). To adapt with the situation, instructors in the higher learning institutions have been left with no option but to embrace blossoming new technologies, and they have used these technologies for content creation, delivery, assessment, and other pedagogical activities.

Whether such tech-academic change has been adequately experienced in the third world countries or not is still a matter that calls for detailed research (Donner, 2008; Thakrar, Zinn & Wolfenden, 2009). The limited existing literature has indicated that most third-world countries, such as most parts of Sub-Saharan Africa, have limited access to computers and related technologies due to poverty, lack of good communication networks, lack of power, language barriers, technical illiteracy, prejudices, and lack of government support (Bitew, 2008; Masters, 2005; Thakrar et al, 2009; Tedre, Ngumbuke & Kemppainen, 2010).

Little has been done to investigate technology integration in Tanzania higher learning institutions, and most educationists, technology experts and other stakeholders are arguably appearing not to focus their attention on this issue (Hennessy et al, 2010). Therefore, the purpose of this qualitative study is to explore opportunities of integrating new digital technologies by teachers and students in Tanzania's higher learning institutions. In this study, new digital technologies mean all the current digital innovations, software and open source, web 2.0 tools, social networks and media, computers, and all mobile devices that people use for information sharing and communication (see Mugane, 1997; Agbatogun, 2013; Siemens & Tittenberger, 2009).

Three research questions will be answered in the study:

1. What are the new digital technologies that have been integrated in Tanzanian higher institutions' teaching and learning?
2. Why do learners and instructors use the digital technologies they use?
3. What are the new digital technologies that learners recommend to be integrated in day-to-day pedagogical activities by their instructors?

The present study seeks to contribute to the body of knowledge by exploring the un-grabbed opportunity in using technology in higher learning classrooms' content delivery and sharing. This study is critical to Tanzania's higher learning instructions and pedagogical practices. It shows the kind of new technologies that have been integrated in Tanzania's higher education by learners and instructors, and it suggests other digital tools that could effectively be integrated, considering the existing technological advancement in the country.

## Literature Review

### Technology and Learning

Collins & Halverson (2009) described that learning how to learn and learning how to obtain useful academic resources are the most important goals of education in the current education paradigm. This describes the existing

learning environment in which learning has to be self managed and self directed (Trilling & Fadel, 2009). As Trilling and Fadel (2009) claimed, learning in the 21st does not end in getting what textbooks write, but it goes further to learning how to easily learn the content, while also mastering a broad collection of essential learning skills, innovation skills, technology skills, career skills, and other skills that one needs for work and life (see also Jukes, McCain & Crockett, 2010).

Explaining the new learning environment, Siemens and Titternberger (2009) asserted that since learners can easily afford the internet and connectivity, the information cycle in higher education has changed from creation to validation. Siemens and Titternberger (2009) added that the organization, sequencing, and structuring of information is no longer under control of institutions, organizations, instructors or experts, but has largely fallen under the control of individual learners. As a result, learning has been "like opening a door, not filling a container" (p.3). They further described the internet has increased a number of online participants, who have expertise in co-creation and re-creation of new learning content by utilizing the content formerly created by others.

In support of Siemens and Titternberger's (2009) idea above, Johnson et al., (2013) stressed on the fact many people use mobile learning (i.e. learning that takes place via wireless devices like mobile phones, personal digital assistants (PDA's), and/or laptop computers) for acquiring information and understanding. According to the Horizon Report of 2013, most people own and carry around a variety of mobile devices (Johnson et al., 2013), and they use these devices to access information and learning materials from any location convenient to them. Mobile learning, which is mentioned as the latest method of content delivery (see Peters, 2009), is characterized by the adequacy, timely, and learners' directedness, and this meets the demands of the 21st Century learner (Berking, Haag, Archibald & Birtwhistle, 2012).

## General ICT Status in Tanzania

The development in information and communication technology (ICT) in Tanzania has a long history. Although, as in most Sub-Sahara African countries, Tanzania faces such challenges as lack of good communication networks, higher illiteracy level, extreme poverty, lack of viable government support, and probably the worst one, lack of power/energy (Thakrar et al., 2009; Tedre et al., 2010), in the past two decades Tanzania has experienced a noticeable advancement in the use of ICT in different spheres (Kafyulilo, 2011). New technological advancements have helped millions of Tanzanians to overcome the some of technological challenges which were identified by Thakrar et al. (2009) and Tedre et al. (2010), including lack of communication networks, poverty and language barriers.

China's technology industry, for instance, has made smartphones, tablets and other forms of little-energy mobile devices available, at prices affordable to all the people, and to the young generation in particular (Custer, 2012). Most youths, who form the highest age group among tech consumers, use and own some form of computer and/or mobile device. To make things even better,

telephone service providers have made the GSM Internet available on the hands of these millions mobile device users (Hesselmark & Engvall, (2005). Because of the considerable mobile device accessibility, most youths, to date, spend a considerable amount of their daily time switching from one device to another, performing multi-tasks ranging from playing music, watching YouTube videos, playing games, web browsing, instant messaging (IM), and social networking (Sambira, 2013).

**The Use of Technology in Tanzania's Education**

The use of technology in Tanzania's education system may be looked at from two different, yet related, angles. The first angle focuses on integration of technology as a subject in the curriculum of different educational levels in the country. To keep up with the changing world, as far as globalization is concerned, the country had no choice but to find a way in which it would produce school graduates with the ability to use technology in different domains, in order to be able to meet the expanding world's employment needs and competition (Hare, 2007; Hennessy et al., 2010; Kajuna, 2009). Officially, the process to introduce technology (ICT) as a subject in Tanzania's curriculum started in 1997, when the first official syllabus for school computer studies was introduced in Tanzania's secondary education (MoEVT, 2007; Hennessy et al., 2010).

To date, computer studies as a subject in secondary education faces a lot of challenges, and it is not taught in most secondary schools due to diverse reasons (MoCT, 2003; Ottevanger, Van den Akker & de Feiter, 2007; Hare, 2007). Most schools in rural areas have no electricity, and most schools in general have no equipment such as computers, which are necessary equipment required for this subject (MoEVT, 2007). Due to these factors, computer studies have continued to be a day-dream to many secondary school students and stakeholders.

The second angle in which one can examine the use of technology in Tanzania's education system is based on the integration of digital technology in day-to-day pedagogical activities like classroom instructions, evaluation and feedback, in teaching other subjects, and searching for online resources. After 1997's introduction of computer syllabus in secondary education, several other technological based programs were developed to enhance the use of digital technology in Tanzania's education, but studies have shown that majority of schools are not integrating digital technology. Hare (2007) and Vesisenaho (2007) asserted that the use of digital technology has only been observed in a few urban private secondary schools. Similarly, Ottevanger et al (2007) explained that even in those few private schools, digital technologies are mostly used for administration purposes only and students do not have access to them. Generally, in most of the schools and education programs, teachers and students are not yet officially using technology as a tool for enhancing teaching and learning in their subjects (Hare, 2007).

In recent years, there has been several privately sponsored projects which finance and advocate the use of digital technologies in Tanzania. BridgeIt

initiatives, for instance, is a project which is financed by the United States Agency for International Development (USAID) to facilitate e-learning in the country (Kasumuni, 2011). In this project, which is locally known as Elimu kwa Teknolojia (Education through Technology) teachers in about 17 regions and about 150 schools used Nokia N95 mobile phone to download short videos (up to 7 minutes), which eventually are shared with students by using TV screens mounted in students' classrooms (Ali, 2011).

## Digital Technologies in Tanzania's Higher Learning Institutions

There is no enough evidence that higher learning institutions in Tanzania are adequately committed to the development in the use of technology (Kafyulilo, 2011). Even among the largest universities in the country, technology integration is still zero or inadequate. Kajuna (2009) found that technology integration at the University of Dar es Salaam, the country's oldest and one of the Africa's prominent universities, was at the lowest level. He suggested that, for a successful integration of technology at the University of Dar es Salaam, there was a need to prioritize and emphasize on periodic basic technology trainings for faculty, creation and implementation of technology plans that will involve the teaching staff, creation of the technology committee whose main responsibility will be overseeing technology use on campus, and fostering partnership with the community, NGO's and different technology stakeholders to maximize funds for obtaining technological services and equipment.

Another case study done at Iringa University College of Tumaini University, provided a number of anecdotes regarding the use of technology in higher learning institutions in Tanzania (see Tedre et al., 2010). In their report, Tedre et al. (2010) described that, although there are lot of project accomplishments which are reported in academic conferences, to funding agencies, and in journals, it seems that some of the stories are overtly exaggerated. They explain that lack of enough equipment for students and staff, network problems, lack of knowledgeable system administrators, and lack of staff training still pose challenges and threat to the integration of technology in Tanzania's higher learning institutions.

Kafyulilo (2011) also asserted that, although shortage of technological tools, lack of tech-know-how among teachers and students, and lack of power contribute to the inadequate use of technology in Tanzania, the main challenge for technology integration in Tanzania is an apparent lack of commitment by the government, schools and teachers. Although the government has been preaching its commitment to the use of technology as a means of achieving the Vision 2025 (Kajuna, 2009), corruption and lack of sufficient monetary support to execute different technological plans and projects have contributed to an indisputable failure.

## Method

This study employs qualitative research techniques which rely solely on the collection of non-numerical data such as words and pictures (Cresswell, 2013; Johnson & Christensen, 2012). Generally, this study is explorative in nature, as it

studies the phenomenon in a natural setting, by investigating perspectives and views of a group of people on the integration of technology in Tanzania's higher learning institutions.

## Research Site, Population, and Participants

The research site for this study was Tanzania, a country located in East Africa. The population involved in this study included higher learning institution professors/lecturers, students and other educational stakeholders. Due to time limit, this study managed to recruit six participants, who are three students (two females and one male) and three teachers (two male and one female) from three public higher learning institutions in Tanzania. These participants have ranging knowledge and experience in the use of digital technology for different purposes like in learning and teaching, accessing and sharing information (communication), socialization and entertainment.

## Sampling Strategies

After the approval from the university's Institutional Review Board (IRB) was obtained, multiple sampling strategies were employed to recruit a suitable sample for this study. The first sampling strategy employed was the criterion (purposive) sampling strategy in which the researcher specified the target population and then identified a few individuals who were suitable to the study (Johnson & Christensen, 2012). The characteristics that were considered in this research were being a higher learning instructor, and being at least a sophomore (second year undergraduate student). Freshmen were not considered for this study because their short duration at the university could have not given them a full understanding of higher education teaching and learning, based on just a few classes they have taken since they were admitted.

The second sampling strategy employed in this study was convenience sampling, in which the researcher included the people who were available and willing to participate in the study (Johnson & Christensen, 2012). The researcher used his three acquaintances, who are lecturers at the University of Dar es Salaam, Mzumbe University, and Sokoine University of Agriculture (SUA).

The third sampling strategy used in this study was the snowball sampling, in which the researcher used formerly recruited participants to identify one or more additional people, who meet the stated characteristics and may be available to participate in the study (Johnson & Christensen, 2012). The researcher used the three lecturers he recruited to recruit the three students who participated in this study.

## Data Collection

Because the main goal for this study is to come up with detailed data, the researcher planned to use different data collection techniques, in order to accommodate/access diverse participants. Telephone and online (both synchronous and asynchronous) interviews, were conducted between the researcher and participants. After the recruitment process, participants were

given two options – telephone interviews and online interviews – and each one of them chose the best option that worked for them. Face to face interviews were not included in the options because of the distance that existed between the researcher's location (USA) and participants' location (Tanzania). Asynchronous online interviews were only used for follow-up questions that emerged after telephone and synchronous interviews. The researcher wanted to take advantage of the emerging design in order to capture some new ideas as they emerged during the interview (Creswell, 2013).

Basically, interview questions were drafted in both English and Kiswahili, the Tanzania's national language. The researcher believed that even though participants could speak English, they could not have the vocabulary capacity or the same knowledge of nuance compared to a person who speaks English as their first language. Participants could communicate their ideas in details when they used the language that was native to them. The researcher, however, left this on participants' own decision, and some preferred the use of Kiswahili while others opted for both English and Kiswahili.

Interview questions were constructed to collect the information from participants on their experience with the use of (new) digital technology in their daily life and in the academic settings. Telephone interviews lasted between 30 and 45 minutes, depending on probes that emerged based on individual participant's responses. Online interviews used between 2 and 4 hours, depending on the probes and participants typing speed. The following are some of the interview questions that were used for both students and lecturers:

- What devices (such as desktop, laptop, tablets, smartphone, etc.) that you use for information, communication and entertainment?
- What do you use those devices for?
- What are the social medias that you have accounts with, and what do you use them for?
- How do you think the use of computers, mobile devices, and social networks for educational/learning purposes have helped or can facilitate your learning/teaching?

Participants were also asked category-specific questions. Students were asked about the technological devices and social networks that their lecturers/professors have used or are using for teaching and instructions. They were also solicited which technological devices and online tools/social media that they would use in their instructions for classroom and out-of-classroom activities, if they were lecturers (See Appendix A for the students' Interview Protocol). Lecturers, on the other hand, were also asked about the social medias that they are familiar with and how they think they could be used for instructions. They were also asked to give their perspective on how they think the use of computers, mobile devices, and social networks for educational/learning purposes have helped or can facilitate their teaching (See Appendix A for the teachers' Interview Protocol). All telephone Interviews were audio-recorded for easy transcription and coding process.

## Data Analysis

Data analysis in this study employed the open coding, by using MAXQDA software, in which all transcripts were read several times to identify and understand ideas and concepts which emerged during the interview. The identified codes and themes in all transcripts were marked and tabulated in similar categories, to identify common themes across participants. At this stage, some participants were re-contacted to provide more information on things that seemed to be more interesting to the researcher, in order to make use of the emerging design.

## Validation Strategies

For data validation and verification, this study employed member checking and reflexivity strategies. For member checking, the researcher's interpretation of the data was shared with the participants to see their agreement or disagreement (see Cresswell, 2013). For reflexivity, the researcher utilized his knowledge of the study area. He was born, raised and educated in the research site, and this gave him sufficient ability to reflect on some of the emerged themes. The researcher also has a certificate in Computer Assisted Language Learning (CALL), and he is currently pursuing a PhD in instructional technology. All these guided him to put his analysis and interpretation of the data in a professional and acceptable ways in this field of study.

## Results

After careful examination and analysis of the data, different themes, subthemes and codes were developed to answer the research questions. The following are the themes and subthemes that were obtained from the data collected from the six participants:

## Common and Utilized Digital Tools

Results showed that not only the participants were familiar with a number of digital tools useful for instructions, but also they owned one or more devices and used them for different purposes.

**Familiarity.** The data shows that participants had similar familiarity with the new digital technologies, but they had diverse experience in the technologies that they use and own. All participants know some common digital devices like desktop computers, laptops, tablets (ipads), and smartphones. When I asked them about the social network they know, Facebook was instantly mentioned, and followed by WhatsApp, Viber and twitter. They were also familiar with Skype, Instagram, Tango, blogs and Google+, although some of those social networks came up when participants were responding to my follow up questions.

**Ownership.** All the participants owned laptops, and all the instructors and two of the students had smartphones. None of them (both instructors and students) possessed a tablet, or any other form of personal digital assistance (PDA) apart from laptops and smartphones. I was so interested in knowing why they did not

own devices that are seemingly common among technology users in today's Tanzania. Based on the information they provided, some students and faculty still cannot afford smartphones and tablets. One instructor says "…just a few students do possess smartphones... Smartphones are too expensive to be bought by our students. If even some of instructors have not managed to buy one, what about students?" Contrarily, the other two instructors say that most students in their classes have smartphones. One of them says "majority, may be 90 to 95 percent of students, have smartphones." Supporting these two instructors, all student participants agreed that most of students have devices such as laptops and smartphones, while just a few have tablets.

**Social networks.** All participants in this study have accounts with varied number of social networks, and they spend different amount of time on these social networks depending on the number and kind of people with whom they are connected. One student, apparently the one who did not own a smartphone, says "yes, I have an account with Facebook, but I rarely use it." The other two students said that they use Facebook, Skype and WhatsApp to make connections with friends, and they spend quite a considerable amount of time on WhatsApp and Facebook, since they are connected to GSM networks for most of the time.

All the teachers have have accounts with several social networks including Facebook, WhatsApp, Instagram and Skype. One of the instructor says, "I do not use Skype frequently. I just log in when I want to talk with a friend. But I use Facebook and WhatsApp everyday because I am always logged in, and every time a friend sends a message or a comment, I get a notification".

### Technologies Integrated in Learning and Instructions.

Answering the question about the kind of technologies they used frequently, participants mentioned that, it might be hard to tell which devices they preferred because it depended on the tasks they wanted to perform with those devices. The following were the major tasks that they performed using different kinds of devices/technologies.

**Laptops and mobile devices.** Student participants mentioned they frequently used laptops for typing their assignments and searching for online resources, while they use smartphones mainly for socialization and rarely for academic purposes (e.g. collaboration). One of the students says that "I use my laptop when I type my assignments because I do not want to take my assignments to stationaries (places where they can pay for their assignments to be typed and printed). It is hard to type my assignments using the mobile phone I have since it does not have Microsoft Word and a big keyboard, so I use my laptop". Another student participant rarely used her laptop for socializing or for things other than academic. She says "I have a smartphone that I can carry around and connect with people any time, anywhere, and I think that is why I don't need to use my laptop for that". When I asked her if any of the socializations she did with her smartphone was academic, she says "well, I am not sure. Yeah, I just use Facebook and WhatsApp to ask my classmates about some assignments that I did not understand well".

Teachers, on the other hand, use their laptops to prepare their lesson notes and PowerPoint presentations. One of the teachers says, "that is the best way I can use my laptop. This task cannot be done by other devices like smartphones or iPads."

**Online learning.** Results showed that there are some initiatives to establish online learning (eLearning) support in higher learning campuses. There are eLearning units/centers whose responsibility is to provide technological assistance to teachers and students in order to facilitate learning and instruction. These eLearning centers, however, have not been fully established, and their work still remain to fixing projector and microphone problems in lecture theaters. One of the instructors says, "although our university has eLearning program, it has not yet been strong to be used effectively. This is due to the lack of facilities like computer labs, slow internet at the college, and ineffectiveness of the system (eLearning) itself."

**Computer Labs.** Both universities represented in this study have computer labs. These labs, however, are very small and are not relatively enough for all the students. Due to that, these labs are privileged to and are made available for teachers only, and teachers/students who are teaching/taking courses related to IT or computer science. One of the instructor says, "We have a computer lab with about 100 computers, but only teachers who are teaching ICT courses have access to them".

**TVs and Video/Audio Recorders.** One of the instructors mentions that, although there are lots of challenges, they sometimes use other open-source software and equipment. He mentions that they sometimes use the TV, audio recorders, and video streaming equipment. He says, "We use TVs, and sometimes when we teach communication skills with the component of listening and speaking. We ask them (students) to record, and identify differences in speech. Sometimes we use videos in which students watch and try to understand what is said in videos, for practicing listening".

**Social networks.** Although results showed most students have smartphones and accounts with several social networks, teachers did not make adequate use of social media and networks in learning and instructions. Instructors frequently used social networks like Facebook, WhatsApp, Twitter, Viber and Blogs in different capacities for different purposes, but none of these social networks was used as a primary tool for learning and teaching. Instructors showed their skepticism in using social networks for learning. Their main concern was the usability of these tools and other concerns such as network privacy and security. One of the instructor says "these social networks contribute into the failure of many students in their academic studies because they spend all the time charting, downloading music, etc. Even the way these social networks have been designed, it like basically for social interaction, and not for learning?" Another instructor says "I don't even want my students to know that I am on Facebook. You have no idea; these students can put you in trouble if you connect with them on Facebook."

Students, on the other hand, used some of these social networks for academic-related communications. One of the students says, "my teachers have never used any of those (social networks) for teaching. But I use them to communicate with my fellow students if I miss a class." Another students says "I just use Facebook and WhatsApp to ask my classmates about some assignments that I did not understand well". One of the instructors believed that students do not use social media for educational purposes. According to her, they use the social media for just communicating with friends and relatives, but not for studies. She says, "one time I was listening to BBC Swahili in which three students were asked for what purpose do they use social networks. None of them responded to use for studies".

**Video conferencing.** Results also showed instructors do not use video conferencing tools like Skype, Google Hangouts and Adobe Connect for teaching. One of the instructors says "I could probably use them, but I think the Internet would not allow." Another instructor says, "you want me to use Skype for teaching, how many students would have equipment with cameras?" One of the instructor, however, mentions that he uses Skype for video conferencing with other faculty, and for providing individualized assistance and feedback to students, when they have questions and other concerns, and only when they show that they can have access to that. He did not, however, mention to use it in classroom setting.

## Reasons for Using Digital Technologies for Learning/Teaching

Participants had varied responses on why learners and instructors use digital technologies for learning/teaching. The following were the reasons emerged.

**Searching for resources.** Participants believe that students and instructors use laptops only, and not other devices, for searching online resources. He says that although some students do not possess laptops, they use cyber cafes, or they borrow laptops from their friends, when they want to search for online materials. He says "what I know is that when a student wants to search for materials from internet, he/she uses computer from internet cafes or computer labs, and sometimes sharing their colleagues' laptops."

Students agreed that they use laptops and desktop computers for online resources. They say that they can easily get what they want to study, and they can get materials which go beyond what teachers present in classrooms. One of the students says, "I like searching for materials online. It is very easy to get books and articles online, and that helps me to understand better what my teacher taught me". Another students says, "libraries do not have the assigned books. I do not know how it would be if we did not have the Internet."

**Connection and collaboration.** Although social networks for connection and socialization may be considered a non-academic, results show that some students used them for communicating for academic matters. However, it seems that students preferred the traditional face-to-face as their collaborative method. They did not use any video conferencing tools for discussion because they use

Vimbweta (stabs used by students to hang out with friends and for group discussion). He says "most of the times we have group discussions on Vimbweta."

**Creation and presentation.** Instructors used laptops and desktop computers for creating and presenting the materials in classrooms. While they also used the internet for searching for resources that they share with their students, they also used the same for creating slides and lecture notes that they use in classroom presentations and handouts.

## Recommended digital technologies

Students and instructors did not have a lot of tools to recommend. This could be due to the fact that they were not well-informed of the fact that technology can work so powerfully in teaching and learning. They did not have a background in curriculum design or educational technology and that may have hindered them from seeing potentialities of technology in instruction. The following are their recommendations:

**Web 2.0.** Participants advocated for more use of web tools for searching online resources. They showed that search engines such as Google can be well utilized, and students could be showed how to use them effectively to get the most of it. One of the teachers suggests that this is important because most of the "academic materials are found from strong internet engines like Google where someone can download a book/article etc.".

**Projectors and PowerPoints.** Participants suggested that instructors need to make use of the available projectors for PowerPoint presentations. Students, in particular, indicated that, although projectors are easily available in lecture theaters, just a few instructors use them. He says "I think our instructors should make use of the available projectors. It seems that some of them do not even know how to prepare a PowerPoint presentation for their lessons".

**YouTube.** Results show that students suggest the use of online videos. One of the students mentions that YouTube videos, if integrated, would be useful in learning. She says "I think YouTube videos could help us understand a lot of things. There are good instructional videos that can be used in classroom." Commenting about this, one of the teachers agreed with that suggestion, but his concern is the internet that will be sufficient to stream those videos: "Yes, I agree. But as a teacher, where would I get the internet to download those videos?"

**Social Networks.** One of the students advocated for integration of social networks in instructions. This student recommended integration of as much social networks as available. He mentions in particular Facebook, WhatsApp, Skype, and bolgs (web 2). The student says, "I think I spend a lot of time on Facebook and WhatsApp; if our teachers would find a way to give us assignments to do in these social networks, I would use them for that purpose". One of the teachers complied with the student's idea. The teacher thought that

he could even make some devices and social media a requirement for his class, but he is scared about some of students from poor families, and who cannot afford the devices. He thought that the best he can do is just trying to encourage them to buy the devices and use them for their own leaning purposes.

## Discussion

Although the use of digital technologies is evident among instructors and students, results show that their integration in learning and instructions is still minimal. Instructor participants did not provide information that shows adequate use of the available technologies. The only technologies that both instructors and students make use of are laptops, the internet, and projectors. They use their laptops to search for online resources, and preparing their PowerPoint slides, ready for presentation by using projectors. Participants in this study have unknowingly already integrated these digital technologies in their studies/teachings, and that they have seen how technological integration facilitates learning. The fact that teachers have used Skype for giving feedback to students, still explains how they utilize the idea described in Siemens & Titternberger, (2009) that emphasizes on giving learners immediate and timely feedback.

Another important thing is that, the fact that most students use laptops (and smartphones) for downloading online resources provides an opportunity for instructors to assign them with online activities, games and other pedagogical activities that would help them to understand the content even better. As one of the students suggested, he would like to see his instructors assigning him some instructional activities that could be accomplished by using the tools he already has.

Another open opportunity would be utilizing free online sharing tools such as Google Drive, Box, Dropbox, Sky Drive, OneDrive etc. and share them with other students. The abundance of self-directed search for online resources could be utilized by asking students to upload the materials in shared online folders or resource wikis. This would make students to become co-creator/co-author of the learning materials. Instructors could also assign their learners to create online portfolios of resources they get online and share them with the whole class in order to facilitate collaboration among students.

Social network groups, like WhatsApp and Facebook groups can be created for particular classes and encourage all students to join and share different resources. These social medias make a nice tool for sharing information, exchanging ideas, debating issues and sharing videos, pictures and other mediated resources for each students to utilize. A lot of free YouTube videos, which would be useful in different learning contexts, can be shared on these social networks, and that would help students to come to class well prepared and aware of the previous lessons. Teachers could also use these tools to disseminate information and announcements related to their courses and programs.

As indicated in Hare, 2007 and Kafyulilo, 2007, participants in this study also complained their learning institutions lacked enough technological equipment for all the faculty and students. As participants said, there are no enough computers in computer labs, and because of that the priority is given to students who are studying ICT-related subjects. It is high time that the Tanzanian government saw the importance of investing in the future of its people. Vision 2025 will not be realized, if the government will not be willing to practically fund the learning environment of its higher learning institutions.

The data also showed that, lack of tech-know-how among teachers and students, and lack of power are still the main challenges that hinder technology integration in Tanzania's higher learning classrooms. It seems that instructors still have a limited understanding of the kinds and ways of using different digital technologies for teaching and learning. Participants, for instance, are well aware of the digital devices and social networks which are used for other purposes like sharing information, entertainment, and socialization, but they have a limited knowledge of how these tools could be used for instructional purposes. It seems there are few, if not none, technological trainings, workshops and seminars for instructors. As Kajuna (2009) Teacher training and workshops may well help to remedy the situation, and teachers may learn how to provide their students with technology-based instructions, which would help them to enjoy learning.

## Conclusion

Although a lot of challenges still persist in Tanzania's use of technology due to factors like lack of power and lack of adequate equipment, opportunities for integrating new digital technologies in higher learning institutions still exist. The existing opportunities for integrating new digital technologies such as mobile devices and social networks are not adequately utilized. If properly utilized, digital technologies could make the Tanzanian higher learning enjoyable and highly fruitful. Although the government has not invested enough in educational technology by financing purchase of sufficient technological equipment, teachers and students could still utilize the existing technological setting to a better level. There are many students with smartphones, laptops and other devices, and it will be a waste of naturally occurring opportunities if rigorous actions will not be taken to harness them.

This study, however, faces a number of limitations, the main one being the number of participants recruited and interviewed. This study interviewed six participants, from three universities only. Also the study uses convenience sampling, which may not be a good sampling strategy, for validation reasons. The researcher recommends a detailed study that will incorporate a larger sample size, and probably utilize descriptive data to show the extent to which technology has been integrated. Nevertheless, the information obtained from this study provides a worthy sharing information which can help higher education educators and students to rethink their pedagogical craftiness.

## References


Agbatogun, A. O. (2013). Interactive digital technologies' use in Southwest Nigerian universities. *Education Tech Research Dev 61,* 333–357.

Ali, L. (October 12, 2011). The digital revolution in sub-Saharan Africa. *Aljazeera*. Retrieved from http://english.aljazeera.net/indepth/features/2011/10/201110108635691462.html.

Berking, P., Haag, J., Archibald, T., & Birtwhistle, M. (2012). Mobile learning: Not just another delivery method. *Interservice/Industry Training, Simulation, and Education Conference (I/ITSEC), National Training Systems Association.* Retrieved from http://www.adlnet.gov/wp-content/uploads/2012/12/12079.pdf.

Bitew, G.D. (2008). Using plasma TV broadcasts in Ethiopian secondary schools: A brief survey. *Australasian Journal of Educational Technology, 24(2)*, 150-167.

Collins, A., & Halverson, R. (2009). *Rethinking education in the age of technology: The digital revolution and schooling in America*. New York, NY: Teachers College Press.

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed.)*. Boston, MA: Pearson.

Custer, C. (2012). Chinese mobile phones hold a big chunk of East African market, but that's not a good thing. *TECHNASIA*. Retrieved from https://www.techinasia.com/chinese-mobile-phones-hold-big-chunk-east-african-market-good/

Donner, J. (2008). Research approaches to mobile use in the developing world: A review of the literature. *The information society, 24(3)*, 140-159.

Hare, H. (2007). ICT in education in Tanzania. In G. Farrell, S. Isaacs & M. Trucano (eds.), *Survey of ICT and Education in Africa: 53 Country Reports*. Washington, DC: World Bank.

Hennessy, S., Onguko, B., Harrison, D., Ang'ondi, E.K., Namalefe, S., Naseem, A., & Wamakote, L. (2010). Developing the use of information and communication technology to enhance teaching and learning in East African schools: Review of the literature. Research Report No. 1. Centre for Commonwealth Education & Aga Khan University. Institute for Educational Development – Eastern Africa

Hesselmark, O. & Engvall, A. (2005). Internet for Everyone in African GSM Networks. Stockholm: *Scanbi-Invest HB*.

Johnson, B., & Christensen, L. (2012). *Educational research: Quantitative and qualitative approaches*. Thousand Oaks, CA: SAGE.

Johnson, L., Adams, S., Cummins, M., Freeman, A., Ifenthaler, D. & Vardaxis, N. (2013). *Technology Outlook for Australian Tertiary Education 2013–2018: An NMC Horizon Project Regional Analysis*. Austin, TX: The New Media Consortium.

Jukes, I., McCain, T., & Crockett, L. (2010). *Understanding the digital generation: teaching and learning in the new digital landscape*. 21st Century Fluency Series. Kelowna, BC Canada: 21st Century Fluency Project Inc.

Kafyulilo, A. (2014). Access, use and perceptions of teachers and students towards mobile phones as a tool for teaching and learning in Tanzania. *Education and Information Technologies, 19(1)*, 115-127.

Kasumuni, L. (April 18, 2011). Delivering video by mobile phone to classrooms in Tanzania. *eLearning Africa.* Retrieved from http://ela-newsportal.com/delivering-video-by-mobile-phone-to-classrooms-in-tanzania/.

Kajuna, L. W. (2009). *Implementation of technology integration in higher education: A case study of the University of Dar es Salaam* (Unpublished Doctoral dissertation). Ohio University, Athens, OH.

Masters, K. (2005). Masters K. 2005. Low-key m-learning: A realistic introduction of m–learning to developing countries. Seeing, understanding, learning in the mobile

age. Budapest, Hungary: T-Mobile & the Hungarian Academy of Sciences. Retrieved from http://www.hunfi.hu/mobil/2005/Masters_final.pdf.

Ministry of Communications and Transport (MoCT). (2003). *National Information and Communications Technologies Policy*. Dar es Salaam, Tanzania: MoCT.

Ministry of Education and Vocational Training (MoEVT). (2007). *Information & communication technology (ICT) policy for basic education*. Dar es Salaam, Tanzania: MeEVT.

Mugane, J. M. (1997). Learning African languages with evolving digital technologies. *Africa Today, 44*(4), 423-441.

Oblinger, D. G. (2004). The next generation of educational engagement. *Journal of Interactive Media in Education*, *2004*(1).

Ottevanger, W., Van den Akker, J. J. H., & de Feiter, J. (2007). *Developing science, mathematics, and ICT education in sub-Saharan Africa: Patterns and promising practices.* Washington, DC: World Bank.

Peters, K. (2009). m-Learning: Positioning educators for a mobile, connected future. *Mobile Learning*, 113.

Sambira, J. (May, 2013). Mobile youth drive change. *Africa Renewal.* Retrieved from http://www.un.org/africarenewal/magazine/may-2013/africa%E2%80%99s-mobile-youth-drive-change

Siemens, G., & Tittenberger, P. (2009). *Handbook of emerging technologies for learning*. Manitoba, Canada: University of Manitoba.

Tedre, M., Ngumbuke, F., & Kemppainen, J. (2010). Infrastructure, human capacity, and high hopes: a decade of development of eLearning in a Tanzanian HEI. RUSC. *Revista de Universidad y Sociedad del Conocimiento, 7*(1).

Thakrar, J., Zinn, D.; & Wolfenden, F. (2009). Harnessing open educational resources to the challenges of teacher education in Sub-Saharan Africa. *International Review of Research in Open and Distance Learning,10*(4).

Trilling, B., & Fadel, C. (2009). *21st century skills: Learning for life in our times*. San Francisco: John Wiley & Sons.

Vesisenaho, M., Kemppainen, J., Islas Sedano, C., Tedre, M. & Sutinen, E. (2006). Contextualizing ICT in Africa: The development of the CATI model in Tanzanian higher education. *African Journal of Information and Communication Technology, 2(2),* 88–109.

Appendix A
Interview Protocol for Students
Use of Technology in Learning/Instructions

Name of Interviewee: …...…….

Place/Platform of the Interview: …….

Time: ……

**Introductory Protocol**

Thank you for your agreeing to participate in this research. Just for your information, I would like to audio record our conversations today, in order to facilitate note-taking and clear usage of your opinions, and only myself will have access to the audio recordings, which will be destroyed immediately after transcription. For the information that you will share with me via emails and chats, I will be the only one with access to them. This interview is absolutely voluntary, and before we start our interview, you will be asked to make sure that you signed the consent form I sent you and emailed them to me, to give your consent to the interview.

I have planned this interview to last no longer than 45 minutes. During this time, I have several questions that I would like to ask, and in case time runs short, it may be necessary to interrupt you in order to push ahead and complete this in time. Do I have your permission to proceed?

**Introduction of the Research Purpose**

You have been selected to speak with me today because you have been identified as someone who has a great deal to share about teaching, learning, and the use of technology in our country. My research project as a whole focuses on the improvement of teaching and learning activity, with particular interest in understanding the importance of new technologies and how they could be integrated in our day-to-day instructions to facilitate learning. My study does not aim to evaluate your knowledge in using technology in instructions, but rather what would be your opinions on the use of new technologies.

**Interviewee Background**

To start our interview, let's know each other a little better. What is your current field of study, and how long have you been in that field?

1. Now, lets talk about technological devices that you use. What devices (such as desktop, laptop, tablets, smartphone, etc.) that you use for information, communication and entertainment? (5 minutes)
   Probes:

- What devices do you personally have (desktop computer, laptop, smartphone, tablet/iPad etc.)?
- What are your favorite ones?

2. Thanks for that information. So what do you use those devices for? (6 Minutes)

   Probes:
   - Do you use any of them for educational/learning purposes?
   - Why do you like using them for learning purposes?

3. A lot of people have accounts with different social media such as Facebook, Twitter, Skype, WhatsApp, Viber, Tango etc. for different purposes. What are the social medias that you have accounts with, and what do you use them for? (7 Minutes)

   Probes:
   - Which one do you use more frequently and why?
   - How do you use them for educational/learning purposes?

4. Thank you so much! Now, how do you think the use of computers, mobile devices, and social networks for educational/learning purposes have helped or can facilitate your learning? (7 minutes)
5. A lot of professors/lecturers use technological devices and social networks to facilitate their instructions, and to help students to understand the contents well. What are the technological devices and social networks that your lecturers/professors have used or use for teaching and instructions? Would you give one or two examples of how they use the technology and how the use of technology helped with your learning? (10 Minutes)

   Probes:
   - Did you understand better when they used technology than when they did not use? Why?
   - What kind of technology use in teaching was effective to your learning?
   - What devices/technologies do you think have not been used considerably?

6. Were you a teacher/professor, what technological devices and online tools/social media that you would use in your instructions for classroom and out-of-classroom activities? (5 Minutes)

Thank you for your participation!

Appendix B
Interview Protocol for Instructors
Use of Technology in Learning/Instructions

Name of Interviewee: …...…….

Place/Platform of the Interview: …….

Time: ……

**Introductory Protocol**

Thank you for your agreeing to participate in this research. Just for your information, I would like to audio record our conversations today, in order to facilitate note-taking and clear usage of your opinions, and only myself will have access to the audio recordings, which will be destroyed immediately after transcription. For the information that you will share with me via emails and chats, I will be the only one with access to them. This interview is absolutely voluntary, and before we start our interview, you will be asked to make sure that you signed the consent form I sent you and emailed them to me, to give your consent to the interview.

I have planned this interview to last no longer than 45 minutes. During this time, I have several questions that I would like to ask, and in case time runs short, it may be necessary to interrupt you in order to push ahead and complete this in time. Do I have your permission to proceed?

**Introduction of the Research Purpose**

You have been selected to speak with me today because you have been identified as someone who has a great deal to share about teaching, learning, and the use of technology in our country. My research project as a whole focuses on the improvement of teaching and learning activity, with particular interest in understanding the importance of new technologies and how they could be integrated in our day-to-day instructions to facilitate learning/teaching. My study does not aim to evaluate your knowledge in using technology in instructions, but rather what would be your opinions on the use of new technologies.

**Interviewee Background**

To start our interview, let's know each other a little better. What is your current department, and how long have you been in that department?

7. Now, lets talk about technological devices that you use. What devices (such as desktop, laptop, tablets, smartphone, etc.) that you use for information, communication and entertainment? (7 minutes)
   Probes:

- What devices do you personally have (desktop computer, laptop, smartphone, tablet/iPad etc.)?
- What are your favorite ones?

8. Thanks for that information. So what technological devices that your department/college has, which teachers can use for teaching and instructions? (10 Minutes)

   Probes:

   - Is there any computer labs that you and your students can use for instructional purposes?
   - Do you use them in your instructions?

9. A lot of people have accounts with different social media such as Facebook, Twitter, Skype, WhatsApp, Viber, Tango etc. for different purposes. What are the social medias that you are familiar with? Do you think they could be used for instructions? (7 Minutes)

   Probes:

   - How could they be used?
   - Have you ever used any of them, and how have you used them?

10. Thank you so much! Now, how do you think the use of computers, mobile devices, and social networks for educational/learning purposes have helped or can facilitate your teaching? (7 minutes)

11. A lot of students use technological devices and social networks to facilitate their learning, and to search for more information about the contents that professors teach them. What are the technological devices and social networks that your think your students use?(10 Minutes)

    Probes:

    - Do you encourage them to use those technological resources?
    - What technologies do you think they have not used considerately?

Thank you for your participation!