

# Creating lifelong learning opportunities for persons with disabilities using Information and Communication Technology

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**Abstract:** *There is increasing use of ICT in facilitating lifelong learning that pose challenges for training and retraining more so to persons with disabilities who are less included in programs of adult education that integrate ICT. This study takes constructivism theory and communities of practice to investigate how to create lifelong learning opportunities for persons with disabilities using ICT. Data were collected using interview guide from 30 persons with disabilities enrolled in ICT skills training programme at OUT. Findings indicated that ICT literacy skills among persons with disabilities can be created using collaborative action research in which persons with disabilities are involved. Implementing action research for creating ICT skills training for disabled persons face challenges related to physical, fiscal and human resources. The author calls for more funding for integrating ICT in adult education and creating ICT skills learning opportunities for persons with disabilities as a pillar for lifelong learning.*

**Keywords:** disability, visual impairment, deaf, lifelong learning, technology

## Introduction

Globally, there is a growing use of information and communication technology (ICT) that calls for issues related to training and retraining to address access to information challenges, more so to persons with disabilities. Persons with disabilities face challenges in the use of technology related to economic factors, lack of time, teachers' attitude and low level of knowledge on ICT learning among facilitators, lifelong educators, educational leaders and the community (Fernández-Batanero, Graván, & Rojas, 2020; Iredale, 2018; Mnyanyi, Bakari & Mbvette, 2010) and a low level of availability of resources and institutional strategies (Ramsten, 2018; Oswal, 2019; Rueda & Cerero, 2019). Creating access to ICT for all requires professionals with pedagogical skills necessary to enhance ICT skills development (Günes & Bağcıvan, 2018). Access to information for all need skills development in using ICT tools that are believed to increase equality or to reduce, depending on the social, political and economic contexts within which they are introduced (Unwin, 2009; Fernández-Batanero, Cabero & López, 2018). Technology becomes effective when it is socially shaped. According to Silverstone, Roger, Hirsch, Eric (1992) technology needs to be tamed or appropriated by its users, calling for lifelong learning for all.

Lifelong learning can be referred to the provision of education in its totality. This type of education includes both formal and non-formal patterns of education characterised by its flexibility and diversity in content, learning tools, techniques, and time of learning (Tasçı & Titrek, 2020). With growing use of internet lifelong learning is enhanced through use of technology at all levels of education. The Internet can facilitate learning from early childhood to higher education. It can also facilitate learning in all its forms of provision, including formal (having a curriculum), non-formal (incorporating elements of formal and informal patterns) and informal (without guidance from a curriculum). Persons without disabilities encounter learning throughout their life and at all ages using ICT. How persons do with different types of disabilities access ICT is debatable. The issue of enhancing lifelong learning to all need to consider to a greater extent how persons with disabilities can be included in ICT skills development. When addressing issue of ICT skills development opportunities for disabled individuals, issues to consider include content, approach to learning, connectivity, culture, economic and financial viability, and relevance to the learners. According to UNDP (2001) technology is created in response to market pressures and not the needs of poor people, who have little purchasing power. People with disabilities in low developed countries face challenges related to income and thus inability to participate in use of technology. The overall aim of the paper to identify the prerequisites for and aspects that enable creating lifelong learning for persons with disabilities using information and communication technology (ICT) and their effects on participation in learning and social life among persons with disabilities.

## **Literature review**

The theories of social constructivism theory and communities of practice guided the study. The social constructivism theory is based on specific assumptions about reality, knowledge, and learning, emphasising culture and the context of human relationships and activity (Kim, 2001; Kumari, 2020; Vygotsky, 1978). For example, Kumari (2020) assert that reality is socially constructed through human activity. Alternatively, knowledge is a human product and it is culturally and socially constructed (Kafai, 1996; Prawat & Floden, 1994). Social constructivists also claim that learning is a social process shaped by external forces that occur when individuals are engaged in social activities (Leeds-Hurwitz, 2015; Salomon & Perkins, 1998).

Lifelong learning for persons with disabilities can be well understood when they are engaged in creating the learning opportunities around their cultural and social engagements in collaboration with the external experts, the significant others. While constructing knowledge they are socially engaged and thus call for theories of communities of practice. Social-constructivism contribute to an understanding of the external world, its meaning, and its value is necessarily achieved through social interaction. Leeds-Hurwitz (2009) assumes that humans develop social frameworks and environments to scrutinise and assess their personal experiences concerning the external world. Further, Leeds-Hurwitz (2009) asserts that language is the key component in the system, allowing for developing a model of the real itself. In such a premise, learning becomes an avenue through which individuals become members of a community, learning mediated by cultural artefacts, such as work ethics, rules, and regulations.

When participating in lifelong learning, individuals make meaning of what they experience. The negotiation of meaning is a predominant feature in Wenger's theory of communities of practice. In this theory, practice is a process by which individuals can experience the world and their engagement with communities as a meaningful practice (Wenger, 1999). Wenger developed this concept in the pursuit of enhancing understanding of what is happening in communities. He proposed that the major themes surrounding the practice are 'about meaning as an experience of everyday life' and that life's meaning is a philosophical issue (Wenger, 1999). The implication here is that people in everyday endeavours experience meaning. As the negotiation of meaning features, people talk, act, think, and solve problems. Later, Wenger, Trayner, and de Laat, (2011) referred to communities of practice as learning partnerships among people. These people find it useful to learn from and with each other about a particular domain. Further, the authors noted that communities tend to use each other's practice as a learning resource.

According to Billett (2018), discussions on lifelong learning emanated from the Year of lifelong learning in 1996. The premise "learning is a continuous process" that guided the year of lifelong education in 1996 was introduced and has continued shaping the way we learn, live, and participate in addressing social demands. Lifelong learning is a result of worldwide changing demands in life and work (Billett, 2018; Organisation of Economic and Cultural Development [OECD], 1996; 1998; 2000; 2010; World Economic Forum, 2019). Lifelong learning differs from lifelong education in that lifelong learning is a personal process (Searle, 1995; Billett, 2009). The lifelong education occurs all of the time as individuals think and act, some of which occurs through their engagement with educational institutions (lifelong education) programmes that contribute to periodically to individual's life history (Billett, 2009; 2010). Alternatively, lifelong education is institutional organised learning with specific learning outcomes (Billett, 2010), whereas lifelong learning comprises a personal fact and practice: it is initiated and enacted by individuals in personal-particular ways, as shaped by individuals' ontogenetic development or legacies of life histories (Billett, 2003). One cannot separate directly lifelong learning and education, though are different complement each other, whereas the strongest is lifelong learning. The question to be addressed can now be how are lifelong learning opportunities in the era of technological evolution and innovation benefit persons with disabilities?

Persons with disabilities have a right to lifelong learning. The rights-based approach towards persons with disabilities reflected in the 2030 Agenda is aligned with the UN Convention on the Rights of Persons with Disabilities (CRPD). According to the CRPD (UN, 2006), persons with disabilities have rights to education and learning. In this paper, the emphasis is on learning and not education, for education is a relational concept that calls the interaction between an educator and a student, whereas learning refers to something one can do alone and by oneself (Biesta, 2006). Much knowledge that must be learnt and untaught in formal and non-formal education systems (Billett, 2010). According to Biesta (2006), lifelong learning is an individual issue and an individual responsibility. As individuals are not in isolation, lifelong learning calls for social theories as these individuals learn as they participate and engage in dialogues and individuals, with some elements of teaching and learning process through informal learning patterns that are not linked to academic courses and qualifications (Coffield, 1999; Nind, 2016). Nind (2016) is of the view that it is rare the concepts of lifelong, community, formal or informal learning to be discussed in relation to persons with disabilities, more so those with learning disabilities. While there are increasing discussions related to creating lifelong opportunities for older adult population to increase their well-being, intellectual stimulation and social engagement (Hansen, Talmage, Thaxton & Knopf, 2019; Iredale, 2018; Pstross et al., 2017; Talmage, Mark, Slowey, & Knopf, 2016) little is said about persons with disabilities. Lifelong learning programmes are not designed for improved job skills, nor for qualifications, but rather for offering opportunities to expand

the knowledge of diverse topics, improve creativity, and broaden and deepen perspectives (Hansen, Talmage, Thaxton & Knopf, 2019; Talmage, Lacher, Pstross, Knopf, & Burkhart, 2015)

Individuals with disabilities require the knowledge and use of Information and Communication Technology (ICT) to participate in, and benefit from educational programmes, social life experiences, and securing employment opportunities (Egaga & Aderibigbe, 2015; Escueta et al., 2017; Lersilp & Lersilp, 2019). Studies focussing on the importance of ICT for persons with disabilities indicate ICT can enhance learning in school and social participation. However, there are barriers to ICT learning opportunities for persons with disabilities including interest, awareness, access, cost, training and ongoing support (Ali, 2008; Dadzie-Bonney & Hayford, 2017; Mnyanyi, Bakari & Mbawete, 2012).

## **Method**

The study was qualitative adopting action research design involving 30 (15 Persons with visual impairment and 15 persons with hearing impairment) persons with disabilities who were involved in ICT skills training at the Open University of Tanzania. According to Chevalier and Buckles (2019), participatory action research works on reconciling and integrating research and the advancement of knowledge with people's active engagement. With action research, the researcher acted as facilitator through which persons with disabilities were involved in defining social issue, reflect the process, and addressing continuation of the process of solving the challenge. In this study the challenge is on how we create lifelong learning opportunities amongst individuals with disabilities using ICT. Action research helps practitioners to change their practices because it is practice-oriented, but contains such elements of research that help practitioners to gather information, process the information, reflect, plan and evaluate (Argyropoulos & Thymakis, 2014; Dentith, Measor & O'Malley., 2012; Mills, 2011; Kemmis & McTaggart, 2007; Mnyanyi, 2014). The action researcher was implementing a project that was financed by UNESCO in 2016 through UNESCO National Commission of Tanzania with a view to create information access to persons with disabilities.

## **Results**

In this collaborative action research, the project had a view of creating lifelong learning opportunities to persons with disabilities using ICT. The project was implemented at Lugalo Secondary School, ICT for the visually impaired persons and at Njombe School for the deaf, ICT for persons with hearing impairment. The participants qualification a disability condition, that I am disabled. The participants selection for persons with visual impairment was through the Tanzania League for the Blind association (TLB) in the Iringa region whereas for ICT for the deaf was through Snowballing for graduates from Njombe School for the deaf and students who were at the school during the project implementation. The researcher vision was among other things to find if both students with hearing impairment and those with visual impairment can learn and achieve intended ICT skills development for two weeks.

The ICT skills training had learning outcomes that included to develop the use of ICT in improving life standards, gain income, create learning opportunities using online learning facilities, and hence contribute to the national development. Modules planned included What is a Computer? Fundamentals of computer (Putting on/off and parts of a Computer), Using Microsoft Word, Using Internet as general for all. There were also additional modules for specific disability including Using Non-Visual Desktop application and Keyboarding for the visually impaired. For persons with hearing impairment additional Modules included PC-maintenance and developing a sign language for different parts of a computer.

In facilitating learning for the two groups, the visually impaired training was facilitated by two visually impaired facilitators. The ICT skills training for persons with hearing impairment was facilitated by three training facilitators who had hearing impairment. Further I, the researcher was accompanied by one sign language interpreter for enhancing communication during training and conducting of the research. The three facilitators for the ICT for hearing impaired had a training in Kenya on facilitating ICT skills development sponsored and offered at Deaf Aid in Kenya. Many issues as per study design made the training possible. The three communities of practice interchanging their ideas and experiences mediated by communication. These three communities of practice included the persons with hearing impairment (deaf) community, the persons with visual impairment community, and the facilitators community. The facilitator community included the 3 facilitators with hearing impairment, two facilitators with visual impairment, the researcher and the sign language interpreter. All communities have had own personal experiences and culture built within their community of practice (Figure 1).

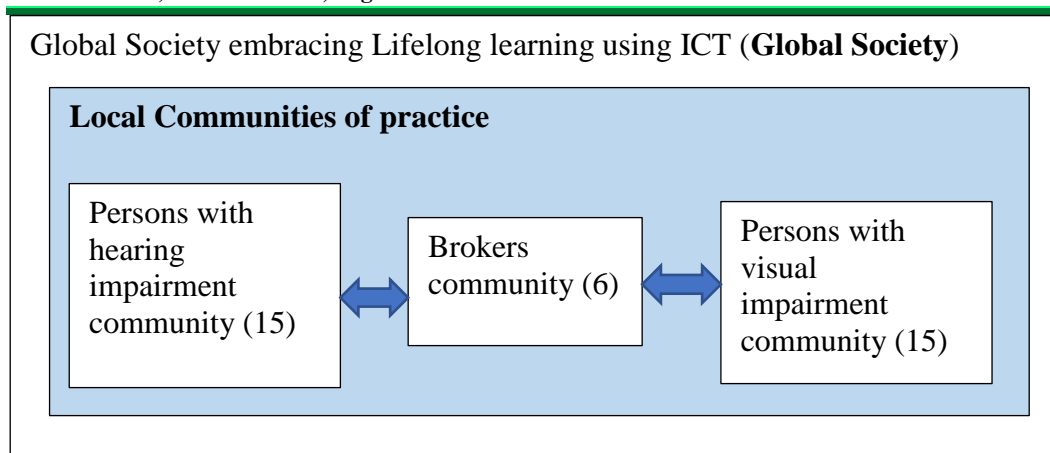


Figure 1: Local communities of practice and global society embracing lifelong learning using ICT

The communities of practice tend to be separated by boundaries that reflect the specificity of various enterprises focussing on the ongoing production of meanings and experiences. Boundary objects includes *artefact, documents, terms, concepts, and other forms of reification around which communities of practice can organize their interconnection* (Wenger, 1999). Boundary objects can also be representations or metaphors that have the power to speak to different communities of practice (Arias & Fischer, 2000). The created meanings and practice can cross borders, as the practice involved multiple interactions between the local and the global communities. For example, in this study, the boundary objects between the communities of practice are ICT skills in different contexts. For example, the broker community can connect the persons with hearing impairment and cross-influence. Wenger (1999) noted that connections are provided by people who can introduce one practice into another, in this study the broker community, that involves the researcher and the ICT skills facilitators. The broker community (Wenger 1999) cross-influences the two communities, the persons with hearing impairment community and the hearing impairment community so they enter in the global society that embraces use of ICT for lifelong learning (Figure 1). In this study, participants from the three communities were cross-influencing their ICT skills through a collaborative action research as they collaboratively reflect on and learn new skills (Mnyanyi, 2014).

### ICT skills for persons with visual impairment

Of the 15 participating trainees with visual impairment, only three had attended at least once a short course in ICT skills, the rest had heard about ICT skills training. During facilitation, the two facilitators for ICT skills for the visually impaired persons involved the three trainees with ICT skills knowledge. The facilitators started training by discussing why they need ICT skills and why the course was important. On the whole the planning was done by the broker group that later included the three trainees with ICT skills. In each lesson the trainees were asked what difficulties they faced and the ICT facilitators for the visually impaired supported them, it was easy for facilitation, as they all shared a common challenge, had visual impairment. The broker apart from having visual impairment had ICT skills. Their narratives upon analyzing followed into the following categories: Need for more training (9); visually impaired persons can learn ICT (7); internet can create independence (10); ICT skills training have improved access to information (15); created communication among persons with hearing impairment and those with visual impairment (10) as narratives indicates:

When I started learning ICT, I was not sure I could learn for such a short period (two weeks). I felt it will be difficult. I am blind, how can it be possible to learn for two weeks whereas non-disabled persons do say Computer is a difficult subject. After training for two weeks I am now able to search information online, enrol online courses, attend zoom meetings, enter YouTube and listen online radio. I can learn also download and listen to music, read online newspapers and share information with my friends. I also created friends with hearing impairment as we communicate through WhatsApp (Tiros, A trainee with visual impairment).

As a result of ICT skills training, we find Tiros, difficulties in learning were resolved through a community of practice as they shared similar challenges with the facilitator and that after training, Tiros, became a global citizen as can find information online and communicate through social media. Above all, Tiros can enrol online courses and online meetings which forms a lifelong learning aspect.

I am happy that I got ICT skills training opportunity. The skills are now helping me at home and in the village. In my village very few have ICT skills, especially on how to use internet, the training has made me important person as can

read online newspapers that have made me to have many friends who come to me to ask news for the day (Supus, A trainee with visual impairment).

ICT skills training for the blind has created independence and access to information in both formal and informal settings. The trainees were able to learn in that short period of 15 days because the training used concrete experiences as they were trained using a real object, a computer in a natural setting (Kirk, 2012; Lowerfeld, 1973). According to Kirk 2012 there are three principles that govern skills training to a visually impaired person: concrete experiences, unifying experiences, and learning by doing. The teachers for ICT for the blind were providing real objects, computers, in a natural setting, were explaining the relationships between the new concepts in computer class in relation to what is well known to them, like keyboard were related to typewriter keys, and all students were learning by doing. After training most reported that ICT had changed their life and they felt more confident than before.

To me ICT is a change agent, initially I was trained as a lawyer but never had a job. After attending the first ICT training for visually impaired persons, I got employment as ICT facilitator for the visually impaired persons. Above all, initially, I was limited to friends who can come across to me, with ICT have created more friends through networking. ICT also have given me an opportunity to change jobs and have improved my job performance. I can now work alone without needing much support from others. I can decide to go online and study different books, online news and make online applications. Important to note is that through ICT have changed completely my profession, from a lawyer to IT expert (Turututu, A trainee with visual impairment).

According to Turututu, a trainee with visual impairment, benefits of ICT are many, including, ability to create friends, ability to get online support, create friends through online communication, attend online courses, read online books, access online resources, use online entertainment and apply online jobs. On the whole ICT supports creation of an equal opportunities and social inclusion (Rony, 2017; Nhemachena, Kusangaya & Gwitira, 2012). Facing a new training environment was not easy for the blind as Gutu explains:

When I started learning ICT I thought it was so difficult and that I cannot learn. But decided in myself that I will do all the best and will attend all the sessions. In the first day the teacher was teaching about parts of the computer, and mentioned a keyboard. Then because I regularly go to the church thought now there are things I know, like a keyboard. But when the teacher started teaching us, I became aware that the keyboard in the church is different from the one used in computers. Since had some skills in typewriter, it was easy for me to learn the keyboarding. For a blind person to use a computer one must learn keyboard skills because all commands are in the keyboard (Gutu, A trainee with visual impairment).

I was a sighted person until 50 years old when I became blind. During my sighted life had never heard of any blind persons using a computer. Once I became blind the idea was to learn to use Braille. I had never used a computer in my life when was sighted. I was a Chemical Engineer. But after getting opportunity to learn ICT for the Blind at OUT, I used it and I am the ICT facilitator for persons who are blind at OUT. I am so happy. After learning ICT, I now do participate on professional courses offered online. If I want to learn something I just go to the internet and learn by myself (Damy, A trainee with visual impairment).

I became blind at the age of 26, had never attended ICT class. During this training especially on the topic "internet" helped me to find a course application and filled in online with the support of my facilitator. Have developed confidence that I can still improve my standard of living though I am blind. I am now planning to join a Bachelor Degree. The challenge is now how to get computers and where to get further training when needed (Suzizi, A trainee with visual impairment).

The trainees indicated to have created confidence as they can learn, secure training opportunities and even communicate with global community. The confidence was also noted on how they rated their skills acquisition after the training (Table 1). Most of the trainees had a view that the training had positive outcomes. The challenges hinted included shortages of training opportunities, shortages of ICT tools to use and places where they can find experts to support them. The idea of having ICT skills training for persons with visual impairment opportunities calls for funding and government intervention.



Table 1: Trainee with visual impairment rating scales on training outcomes (N=15)

Module	Did not understood at all	Did not Understood	Need more practice	Understood	Understood Most
Introduction to computers	0%	0%	17%	8%	75%
Keyboard Overview	0%	0%	0%	33%	67%
Introduction to Screen Readers	0%	0%	0%	50%	50%
Introduction to Ms Word	0%	0%	8%	8%	83%
Introduction to internet and Emails	0%	0%	33%	58%	8%
<b>Average</b>	<b>0%</b>	<b>0%</b>	<b>12%</b>	<b>31%</b>	<b>57%</b>

### ICT for persons with hearing impairment

Under normal circumstances, it is very difficult to recognize or identify a person with hearing impairment. Such persons move freely without any support, though they have to be careful not to be knocked down by vehicles as they cannot hear the noise of an oncoming motorized vehicle. They do normal manual work, and rarely will you find them begging. However, in Africa, due to lack of special facilities and expertise, most people who are deaf are illiterate. A few parents have managed to take the affected children to special schools for the deaf, but basic education is all they can get. The higher education sector has no provision to support learning for the deaf at the tertiary level. Rarely you find deaf persons employed in offices. This calls for creating ICT skills training for the deaf so they can participate fully in the community they live as part of local and global societies.

The challenge with persons with hearing impairment was how to teach them ICT skills whereas their community uses sign language. In implementing collaborative action research that calls for shared creation of knowledge and skills through identifying a problem and solving step-by-step (Mnyanyi, 2014). In this study trainees with hearing impairment collaborated with researcher and the facilitators to find means through which communication can be possible. The training started by creating ICT skills signs to use during teaching and learning process. During the stage of creating ICT sign language, the sign language interpreter and the three ICT facilitators lead the process. I, the researcher interviewed, asked questions and video recorded the signs during the sessions. The ICT skills signs were collaboratively created ( <https://www.out.ac.tz/vis/#> ) and used for training.

The trainees with hearing impairment findings indicated ICT skills training supported them in developing: self confidence (9); ICT Sign language (15); and self-determination (8). The ICT skills also had outcomes related to creating friends through Facebook (8), reducing dependence in sign language interpretation (8), creating job opportunities (10) like ICT maintenance and data entry and participate in online lifelong learning (8) especially in ICT industry like participating in Cisco examinations as narratives below indicates:

When I saw a laptop or a computer initially, I was afraid to touch thinking that I can destroy, as had no experience at all about using ICT. My worry was that will it be possible for me to learn ICT skills as did not do well in my secondary education. During training, I was so amazed to see my fellow deaf teaching me. We started by creating signs, after that I found the course was easy to me! (Tatti, A trainee with hearing impairment)

I can now follow my friends in Facebook and through email. I have friends some of them are with visual impairment. I am so happy! I can communicate with my hearing friends without a need of sign language interpreter, just we text or email each other (Sunguv, A trainee with hearing impairment).

For me to learn ICT strategy used was to learn the name of the parts of the computer and their functions using sign language. It was my first time to touch a computer and thus had to learn by heart different parts. Then learn keyboard skills, mouse and how computer parts are connected to one another. After had learnt basic computers and internet a new strategy was invented. This involved use of google translator where I was taking English word and then placing to google translator where it was translated in Kiswahili so that I understand and continue discussing with my friends (Yupis, A trainee with hearing impairment).

I am a deaf, I am happy to be the participant in the first ICT training course at OUT in April 2015. After training, I am doing my internship in a government owned company. Initially they thought oooh a deaf! But now am happy they know that I can do things. My work is on repairing PCs and installing software and making preventive maintenance. I am happy but not sure of getting a permanent job as do not have a certificate of secondary education (Soliwa, A trainee with hearing impairment).

On the whole trainees with hearing impairment, they enter ICT class without having developed concepts about a computer as do have communication barriers. Some enter into ICT without even a knowledge in using a mobile phone. Deaf have communication barriers that make them face a barrier in accessing lifelong learning and job opportunities. ICT skills trainees had a view that ICT supported them in improving their quality of life through Networking, gaining employment, gaining new skills, supporting in communication, reducing communication barriers, and changing jobs.

## Discussion

The investigation addressed issue on how to create lifelong learning opportunities for persons with disabilities using ICT through the lens of communities of practice (Wenger, 1998, 2002) and social constructivism learning perspective (Leeds-Hurwitz, 2009; Vygotsky, 1978). The assumption was that participating communities, the community of persons with hearing impairment, the community of persons with visual impairment and the community of brokers were connected to their indigenous knowledge and practice related to what they are used to. The broker community was exposed to indigenous knowledge about how to go about within the community and with additional ICT skills and ICT facilitation skills. Lave and Wenger (1991) have shown that knowledge is distributed and shared in the community as the people interact in their day-to-day activities. For creating interaction for sharing the knowledge amongst groups, a training session for 15 days was created through which the broker and other communities had opportunity to interact.

Disability in Tanzania need to be addressed so we develop systems that support persons with disabilities in accessing lifelong learning opportunities. ICT training as a glowing industry through which all people improve life standards need to be accessible to all, including persons with disabilities. According to the national survey on disability in Tanzania (2008) only 3.1 percent of those households headed by persons with disabilities indicating a problem facing persons with disabilities regarding employment opportunities. Persons with disabilities face widespread barriers in accessing services in health care (including rehabilitation), education, transport and employment (WHO 2013). As a result of widespread barriers disabled people are perceived as a low class in the society because of their living limitation, low level of education, unemployment, very low income and participation restrictions in life situations making persons with disabilities more dependent (Braum, 2020; Lynch & O'riordan, 1998; Sunsern et al., 2012; Wanaratwicht et al. 2008).

## Conclusion

People with disabilities represent a large proportion of unemployed persons especially in developing countries. In creating employment to persons with disabilities, like those without disabilities, lifelong learning opportunities have to be accessible to all. It is important to note that most jobs fade away and new jobs are created that require training. On the other hand, job seeking skills have dramatically changed to using internet as a communication tool. It is those with ICT skills can access job markets. The challenge has been that there are little opportunities for skills development in Tanzania. The Open University of Tanzania has developed ICT skills that would later support individuals with disabilities to access further learning opportunities. The challenge University faces are related to human, fiscal and physical resources in order to increase its ability to create and facilitate skills training for persons with disabilities. On the whole, ICT has proved to be potential in influencing learning of persons with special needs and disabilities and hence improve their quality of life and a vehicle for changing jobs, for creating new skills, creating new jobs, creating opportunity for testing and learning other IT skills, and facilitating learning in a more inclusive way than expected. The study calls for adult education institutions and other institution to use collaborative action research through a lens of communities of practice to create lifelong learning opportunities to persons with special needs and disabilities using ICT.

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