

Pan-Commonwealth Forum on Open Learning, 14-16 September 2022, Calgary, Canada.

Supporting Institutions to Utilise Assistive Technology in ODL to Enhance Learning of Trainees with Disability in Low-Income Countries

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Abstract

This paper presents information from a study of the use of Assistive Technology (AT) during open and distance learning (ODL) in TVET training institutions. There has been an increase in the number of people with disability enrolling into post-secondary education and, with the advent of COVID, learning has often moved to either a blended or online mode. There is also an increasing level of digitisation across the world, and a need for learners to be fluent in some of the digital technologies that are changing the nature of education and the workplace. Training for instructors is a key element of ensuring trainee success and inclusion when using AT in the learning environment.

Data were collected via a range of sources. A desktop review identified areas of appropriate literature. A survey was then developed and conducted with staff in TVET institutions which gathered data on competencies required by staff to engage learners and their experiences with AT and trainees with disability. This data resulted in the development of a course to support staff working with AT and trainees with disability in an open and distance mode. Development of the course is described along with its initial piloting and feedback from participants.

Keywords: Assistive Technology, TVET, Inclusion, Open and Distance Learning, Low-Income Countries.

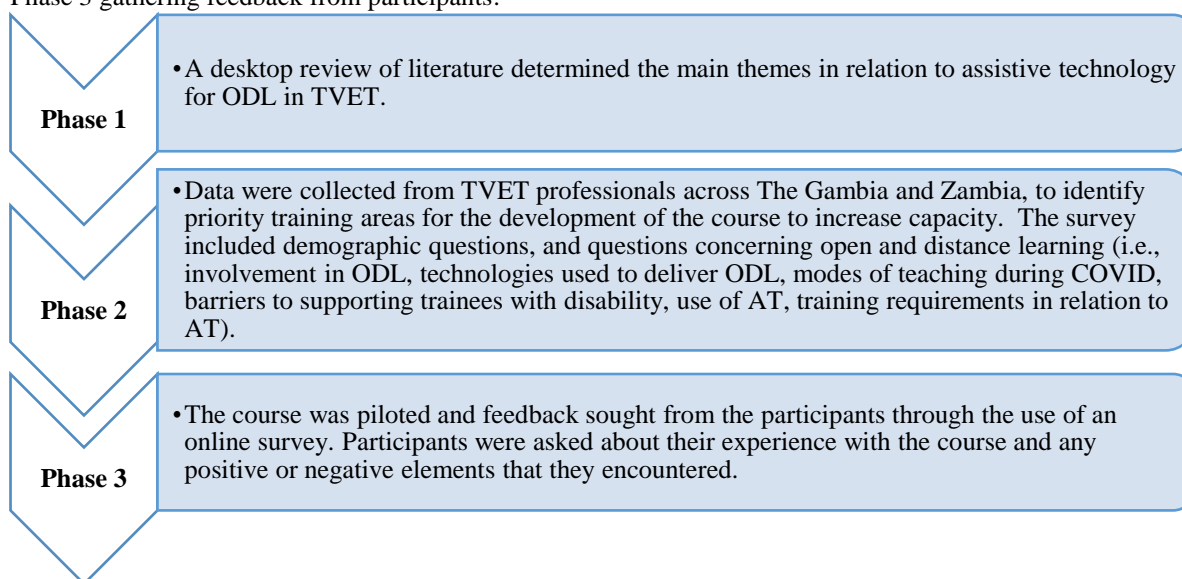
1. Introduction - Trainees with Disability in Online and Distance TVET

There are approximately 15% (or 1 billion) people with disability across the world, with 80% of those people in low- or middle-income countries (World Health Organisation, 2022). People with disability, particularly in these countries, require access to education and training to be part of the workforce and community (Cinquin et al., 2021). United Nations (2015) Sustainable Development Goal (SDG) 4.5 states that "...by 2030, [countries will] ...ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations" (para. 5). TVET institutions contribute to a number of SDGs, including 4.5, in supporting sustainable development (Legusov et al., 2021). TVET training involves not only the acquisition of technical skills, but also develops critical understanding, problem-solving abilities and community mindedness (Haßler et al., 2020).

There has been an increase in the number of people with disabilities enrolling into post-secondary education across the world (Munyaradzi et al., 2021). Many enrol into TVET centres/institutions, and with the advent of the global COVID pandemic, the learning has often moved to an online and distance mode (UNESCO-UNEVOC, 2021a). The study described here is significant for two reasons. Firstly, an increasing number of trainees with disability enrolled in TVET settings will require access to AT to successfully complete their studies. Secondly, the training of TVET staff to accommodate their needs, using AT is required, particularly in light of the move to online and distance learning modes. To ensure that TVET staff in low-income countries have the necessary training to address the needs of students with disabilities, the Commonwealth of Learning proposed development and piloting of an online course for TVET instructors. The course was designed taking into account the substantive literature in the area and results of a survey conducted with TVET trainers.

2. Research Design

Data were collected in 2021/2022 in three phases, with Phase 1 and 2 informing development of the course and Phase 3 gathering feedback from participants:



Thematic analysis of the literature and the surveys was undertaken as described by Clarke and Braun (2013) to identify and analyse patterns in the qualitative data. The phases of analysis included familiarisation with the data, coding, identification of themes, review of themes and refining and naming themes. Analysis of the initial data provided an overview of current thought in the area of AT for ODL in TVET and identified areas of consideration for developing the course. The results of the desktop review and survey are discussed in the following sections. The development of the online course is then described, followed by the pilot participant feedback.

3. Results – Phase 1 -Desktop Review

A number of search terms were used to conduct a desktop review examining the use of assistive technology (AT) for open and distance learning (ODL) in technical and vocational education and training (TVET) in low-income countries, including: AT, assistive technology, TVET, technical vocational education and training, open and distance learning, online learning and low-income. Access to university library databases ensured a broad range of individual databases were searched. In addition, a Google Scholar and general online search were conducted to identify any appropriate grey literature (i.e., reports and unpublished literature). Little specific literature was identified that incorporated all of the search elements. However, a number of areas of literature became evident that were relevant for an examination of AT for ODL in TVET. These areas included:

- TVET and Technology
- AT and TVET
- ODL and TVET
- AT and ODL

Considerations for the use of AT in TVET were extrapolated for relevance for open and distance modes in low-income countries.

3.1 TVET and Technology

The nature of work and education is changing as a result of increasing technological development (Douse & Uys, 2019; Mutambanengwe & Dambudzo, 2019; International Labour Organisation, 2021). TVET institutions need to also change and adapt to address the needs of workplaces in a digital environment. Hassan et al. (2021), in a systematic literature review on ICT penetration in TVET, found that the "... overall ICT enablement in TVET education is very low" (p. 81638). The successful use of ICT in TVET requires leadership, financial support and planning, networking, staff training in ICT and adult learning pedagogy, experiential learning, appropriate selection of media and methods for delivery, support systems for learners and evaluation (Genç & Koçdar, 2020).

In many low-income and geographically diverse areas, however, access to technology and to trained staff is an ongoing issue that has been exacerbated by the lockdowns caused by the COVID pandemic and by institutions' lack of support for staff. UNESCO-UNEVOC (2021a) highlighted the provision of support for TVET staff in a digitised world as being a priority area for its medium-term strategy 2021-2023. It is important for the trainer to consider the needs of all students (Lowenthal et al., 2020) as "...learners with disabilities may face difficulties in interacting with peers or digital platforms because the platforms are not inclusively designed and optimized for all learners" (Moon & Park, 2021, p. 320). The W3C Web Accessibility Initiative (2022) developed *Web Content Accessibility Guidelines* (WCAG) which assist content developers and website designers to check the content of the online learning against accessibility standards for learners with diverse needs (Lowenthal et al., 2020).

3.2 AT and TVET

Assistive Technology (AT) is the overarching term used to describe assistive products/devices and assistive services that support people with disability to access learning and social interaction in an educational setting (Chambers, 2020). Talib et al. (2019) describes the necessity of using AT in education for people with disabilities in order to enhance their participation in the community and workforce. AT in TVET can play a crucial role in supporting trainees' learning and graduation rates (Fichten et al., 2020;), however, in some countries, such as South Africa, access to AT can differ substantially across the country (Lyner-Cleophas, 2019). There is a concern that many institutions in the TVET sector do not adequately address the support needs of students with disabilities (Fichten et al., 2020).

In low-income environments, free and open-source software (FOSS) and AT can be utilised (Lyner-Cleophas, 2019). In-built software is also available on most devices (if these are available) or mobile phones, and include accessibility functions such as speech-to-text options, and keyboard and screen modifications (Fichten et al., 2020). Staff (including faculty, librarians, and ICT coordinators) need to be trained to identify and use appropriate AT to support students with disabilities otherwise their potential may remain unmet (Munyaradzi et al, 2021). UNESCO-UNEVOC (2021a) state "TVET staff need to be given access to sufficient professional development opportunities to allow them to build up their competencies and incorporate modern teaching methods and assistive technologies in the classroom" (p. 8).

3.3 ODL and TVET

TVET is no longer confined to face-to-face learning institutions, but is also offered in online and distance modes (Mutambanengwe & Dambudzo, 2019). Many staff are not trained or ready to use online and distance, or blended, learning, which became particularly evident at the start of the COVID pandemic (Ferreira-Meyers & Pitikoe, 2021; UNESCO-UNEVOC, 2021b). "Blended learning, in which the face-to-face and the virtual are intermingled, is becoming the norm" (Douse & Uys, 2019, p. 29), and requires qualified and experienced staff to be utilised effectively. In addition to staff training, Mutambanengwe and Dambudzo (2019) identified a "...lack of adequate funding, infrastructure, experienced qualified personnel, and relevant learning material" (p. 199) as potential challenges. When considering students with disability as users of ODL, it is important to reflect on the pedagogy and content that will best support these students. Concepts of accessibility and universal design for learning (UDL) may be useful.

3.4 AT and ODL

While acknowledging that online learning can be beneficial for those who are marginalised or have disabilities, there are also specific considerations to ensure that people with disabilities are able to appropriately access the learning (Zhang et al., 2020). There are many benefits to using ODL for learners with disabilities including easy

access from their home, self-paced learning, and collaborative learning, however, the AT required to access ODL must be affordable and available to all learners who require it (Ferreira-Meyers & Pitikoe, 2021). Barriers to accessing online learning include expectations that users can access the systems (where they may require additional training), rapid advancement of technology, and trainer knowledge of which options to select to best suit the students' needs (Zhang et al., 2020). Further, cost and availability are relevant in low-income settings, particularly in relation to purchasing AT devices and access to the internet (Ferreira-Meyers & Pitikoe, 2021).

4. Results – Phase 2 - Survey

The survey gathered participant perspectives on the use of AT in ODL (or flexible) learning in TVET environments. Eighteen participants began the survey, however, only 10 completed all required questions. These were from The Gambia (seven) and Zambia (three). They mainly worked at technical training institutes and vocational training centres. Their roles within these institutions included principal, trainer, administrator and ICT manager. The majority of the participants were male and ages ranged between 25 and 64 years.

4.1 Description of Trainees

Six of the respondents indicated that they had trainees who were Deaf or Hard of Hearing. Three noted that at least one trainee with a physical disability was involved in training. One respondent mentioned teaching trainees with a visual impairment and another stated that they had been involved in training people with dyslexia, autism spectrum disorders, and intellectual disability. Both male and female trainees were involved in the TVET and their ages ranged from 17 to over 50 years.

4.2 Open and Distance Learning in TVET programmes

All participants described a variety of involvement in ODL TVET. Some were primarily involved in online and/or distance learning, while many described a blended form of learning (some online, some in person instruction – particularly for practical sessions, some paper based-print instruction). Internet connectivity was often an issue for online learning. The most commonly reported technology for online and distance learning was WhatsApp™, with seven of the 10 respondents using this tool. Zoom™ was the next most popular technology, followed by Google Classroom. Three participants indicated that an LMS was used to communicate and interact with students, however, did not identify the specific LMS used, while only one participant indicated that a customised app solution was utilised by their organisation. In response to the COVID pandemic, participants reported using a variety of modes of teaching, including blended learning, print-based learning and online learning.

A number of barriers were identified that hindered access to skills training for people with disabilities. These barriers included resources and tools, skills for technology, and communication. In regards to resources and tools, there was an indication that poor access to devices (including computers and translation equipment) by institutions was a major barrier for people with disabilities. Possibly an even greater barrier was the lack of access to internet connectivity or low bandwidth, due to country infrastructure or lack of funds to buy this service. Three participants indicated that poor knowledge of TVET staff around how to support people with disability caused barriers in learning. Lastly, the ability of people with disability to use the technology was cited as a potential difficulty.

4.3 AT Knowledge

When asked to define AT, most participants suggested teaching aids and technology. The descriptions were very broad and general (i.e., “availability of basic technology devices”), and were not clear definitions of AT. Only two of the participants described the improvement of functioning as a result of using AT. Half of the respondents (n=5) stated that they used AT in ODL and when asked to list these technologies, only two participants listed AT (i.e., hearing aid, talking calculator, e-reader, speech recognition software, sign language videos), while the remainder listed standard technology (i.e., Zoom, Dropbox, YouTube, printouts, software, WhatsApp), without indicating how it was used as AT. The lack of AT noted is consistent with the insufficient definitions provided by the participants, indicating a need for further training in this area. Four of the respondents stated that they had ‘limited’ knowledge of AT, one stated they had some knowledge, three had good knowledge, and two had very good knowledge. None of them selected ‘excellent knowledge’.

Participants stated that the role of AT in TVET was primarily to facilitate the education of people with disability and create an equitable learning environment. They noted that AT saved time by allowing independence in accessing content, and reducing challenges. The improvement in quality of teaching and learning for students with disability was mentioned.

4.4 Training in AT for TVET

All the participants answered ‘Yes’ to whether they felt staff would benefit from further training in using AT in open and distance TVET. Some of the noted ATs they would like to use include Slack (collaborative work platform), Google Classroom, laptops and Moodle, none of which is actually AT. The AT that was desired included text-to-

speech software, word predication software, 360-degree camera, and mobility aids. The poor understanding of AT was mirrored in the responses to this question. Most of the participants would go ‘online’ to find out more about AT, with a few also engaging colleagues in discussion and consultation around AT. No specific online sites were indicated.

The areas of training that were considered useful for using AT in ODL TVET included: ICT skills (particularly for distance learning), teaching methodologies, assistive technology, use of digital tools and OER. One participant mentioned animation and gamification, while another noted that communication with people with disabilities was important. The participants suggested that any additional training would be useful for both trainers and trainees, and that support to access AT equipment would potentially increase enrolment of people with disabilities. Further training to promote independence and support for people with disability and to enhance inclusion was highlighted.

5. Analysis of Results from Phase 1 and 2

While there is limited literature on AT in ODL in TVET, there were areas of literature that were pertinent. Benefits and potential barriers that institutions and faculty need to consider were identified, preferably in advance of the commencement of the course/program. Areas of importance include:

- The need to move towards digitised course/training offerings by TVET in line with the changing nature of the workplace and current events;
- Training of TVET faculty to identify and deliver appropriate online courses inclusive of all students’ needs;
- Inclusion of AT in TVET to ensure people with disability are able to access training which leads to meaningful employment and engagement in the community;
- Development of TVET faculty understanding and knowledge of AT so that they can evaluate students’ needs and incorporate appropriate AT into ODL courses.

The participants demonstrated a variety of backgrounds and trainees with whom they worked. The knowledge of AT was low and training in this area was noted by the participants as being necessary to ensure that people with disability were appropriately included in the TVET sector. The results of both the literature review and survey provided impetus for the development of an online course in AT for TVET.

6. Recommendations for Development of AT in TVET Course

When developing faculty capacity to support students with disability to use AT in ODL TVET, there are a number of specific considerations for TVET staff trainers which have emerged, including:

- Developing awareness of the trainees with disability and their specific needs in relation to accessing course materials and assessments in TVET and AT that they use/need;
- Increasing knowledge of appropriate pedagogy and platforms for using AT in online and distance learning, or blended learning;
- Increasing knowledge of types of AT, in particular, free and open- source AT and OER resources, and when these may be used to support students with disability in ODL or blended learning;
- Providing resources to support staff in locating and employing accessible AT in their TVET courses;
- Training for all (staff and users of AT) in regards to ICT and AT that will be utilised in ODL TVET.

By upskilling staff in the use of AT and providing explicit, concrete examples of how and when the AT could be used to support students with disability, the TVET training will be more relevant and equitable for all. The above components were taken into consideration when designing the course, which consisted of six topics (see Table 1 for course structure), and included a variety of learning modes (video, synchronous meetings, readings, tasks).

Table 1

Structure of Course on Assistive Technology for ODL Technology Vocational and Future Education (TVET)

Topic No.	Content
1	Trainee needs and Disability
2	Introduction to AT in TVET
3	Matching AT with trainee needs
4	AT that supports ODL in TVET
5	Applying knowledge of AT to ODL TVET
6	Conclusion and Reflection

7. Results– Phase 3 Feedback from Pilot Course Participants

The course was developed utilising findings from Phase 1 and 2 and was piloted in March and April of 2022. There were initially 38 participants enrolled from Zambia and The Gambia, with an additional four participants joining a few weeks into the course. To determine satisfaction and interaction with the course content, a preliminary questionnaire was sent electronically using Qualtrics™ to all participants in Week 5. The questionnaire incorporated questions concerning participant demographics, an indication of the ease of enrolment and access to the course, how useful they found the training (at that time), what they liked most and least about the course, any additional information that should have been covered, support provided, and their overall thoughts about the training.

The questionnaire was completed by nine of the original 38 participants (24% response rate). Three female and five male participants suggested that it was somewhat easy or extremely easy to enrol in the course and access the content. One male participant found enrolling in the course extremely difficult and accessing the content somewhat difficult. The participants most liked gaining knowledge about AT and the focus on inclusion in the course. The least liked components included time (both to complete the course and the assessments), and one participant suggested that access to the internet and a laptop after working hours was difficult. All participants suggested that the content of the course was appropriate, with no further content required.

When asked how they would use the training in their day-to-day activities, the responses were positive, with one participant suggesting that “I will use it to contribute to Open and Distance education, especially teaching learners with special educational needs”. Another stated they would “... reach out to those who are left out in employment and training”. A third noted, “I will use the AT in supporting my student in different situations in the classroom”. Eight of the nine participants felt well supported by the course facilitators and the only additional support suggested was an increase in the synchronous (Zoom) sessions with the facilitator. One participant did not feel well supported due to connectivity issues and a lack of appropriate technology. Overall, their thoughts about the AT in the TVET training course were very positive. Indicative comments included, “...every lecturer in TVET institutes must be given opportunity to be part of this program”, “It came at the right time when I needed knowledge about handling the differently abled students”, and “It’s a very good rich course for teachers and those handling persons with disabilities”.

8. Conclusion

The data collected and presented indicates a need to build capacity of TVET lecturers in the area of AT to support learners with disabilities. The development of the AT in TVET course was based on the research literature and perspectives of expert informants in the TVET field. Feedback on the pilot version of the course suggests that it was well received and relevant for the TVET lecturers. The success of the pilot program provides impetus for the training to be offered in a variety of other settings, including countries in the Caribbean and the Pacific Islands.

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