Open Educational Resources in Technical and Vocational Education and Training

An overview of the state of affairs and the extent to which the potential of Open Educational Resources (OER) is harnessed in Technical and Vocational Education and Training (TVET)

FINAL REPORT

Robert Schuwer
Ben Janssen
UNESCO Chair on OER and their Adoption by Teachers, Learners and Institutions
Fontys University of Applied Sciences

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Colophon

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Authors:
Robert Schuwer, professor OER and holder of UNESCO Chair on Open Educational Resources and their adoption by teachers, learners and institutions.

Ben Janssen, independent researcher and advisor on Open Education, affiliated to the UNESCO Chair on Open Educational Resources and their adoption by teachers, learners and institutions.

Affiliation:
UNESCO Chair on OER and their Adoption by Teachers, Learners and Institutions
Fontys University of Applied Sciences
Eindhoven, the Netherlands

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Executive Summary

Introduction

This report is the result of a study commissioned by UNESCO-UNEVOC to fill the gap both on mapping the landscape of the use of Open Educational Resources (OER) and open practices in the field of Technical and Vocational Education and Training (TVET) and to provide Member States and UNESCO, in particular UNESCO-UNEVOC, with recommendations to support the creation and the use of OER in TVET. The study was carried out by researchers from the UNESCO chair OER at Fontys University of Applied Sciences in Eindhoven, the Netherlands.

OER and TVET are two worlds of which the combination can contribute much to the realization of UNESCO's Sustainable Development Goal (SDG) 4, which is "to ensure inclusive and equitable quality education for all and promote lifelong learning opportunities"[1].

At the 2nd OER World Congress in Ljubljana in September 2017 an Action Plan for Mainstreaming OER in support of SDG 4 has been accepted. This Plan has been the starting point for a Recommendation for future international collaboration in the field of OER, to be prepared by UNESCO and its Member States before the 2019 session of the General Conference. It is within this context that UNESCO-UNEVOC commissioned this explorative study.

Information and data collection took place in the period June – November 2017 by means of a literature review, a survey and 10 interviews with experts in the field of TVET and/or OER. Additionally, a virtual conference was organized by UNESCO-UNEVOC in November 2017 to collect more information about experiences and viewpoints on specific topics of this study. Sub-reports have been written for each of these four activities.

TVET is understood "to be integral to education and lifelong learning and to refer to all forms of learning of knowledge, skills and attitudes relating to the world of work. TVET comprises education, training and skills development activities relating to occupational fields, production and livelihoods" (UNESCO, 2015d:8).

OER are "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work." (UNESCO, 2012).

TVET covers a broad range of education and training. It concerns young people gaining knowledge and skills from basic to advanced levels (including higher education) and leading to initial qualifications, to adults in continuing education and training. TVET takes place in a variety of learning settings and contexts: in schools, colleges, polytechnics (curriculum-led, master programs) and various other education and training institutions, in enterprises, or in a combination of both; in formal and non-formal education and training; in informal settings, on the job or other socio-economic contexts. Changes in the world of work require that people need to update frequently

[1] http://www.un.org/sustainabledevelopment/education/

their skills and competences at their workplaces (with the purpose of upgrading, re-training, specialist training or additional qualifications). TVET has a focus on providing practical skills that can be applied directly in the labor market.

Another consequence is that people more and more are required to perform changing tasks. These developments lead to an increase in informal on-the-job learning, and henceforth of formal recognition of these learning activities. These developments also lead to new demands to the knowledge and skills base of the initial vocational education and training. All this makes TVET a crucial element in enabling the learning society. It has the potential to contribute significantly to the development of the skilled, knowledgeable and technology-savvy people required to support accelerated, sustained and shared growth. To realize this potential, however, current TVET systems have to acquire agility to stay current and responsive to the quickly changing contextual demands.

OER have the potential to contribute to this required agility of TVET systems. One of the problems of learning materials, especially in sectors facing fast developments driven by ICT, is to keep up with actual developments. To update learning materials is very often a costly and time-consuming process. Open collaborative development of resources by TVET institutions, by TVET institutions and industry, and sharing, reuse and repurposing of resources in the form of OER are ways to cope with these challenges. In this way, OER can contribute to more agility of TVET systems.

Main findings of the study

The literature review has revealed that thus far no substantial research on OER in TVET has taken place and/or has been reported upon. There are not many publications which deal with OER in and for TVET. Obviously, OER in and for TVET is not an issue researched and discussed in international literature comparable to OER in higher education or secondary and K-12 education.

The review, however, is not claimed to be exhaustive and complete: no search has been done into publications in French, Spanish or other languages. With a high degree of probability we can nevertheless state that the present study provides a fairly reliable insight in the current state of affairs regarding (research into) the uptake OER in and for TVET. The information from the interviews, survey and virtual conference gave support for this finding from the literature review.

The study has found strong support for the opinion that OER in TVET has the potential to offer a big contribution in accomplishing the task of skilling people. But it is also found that a large gap exists between asserting this opinion and activities to actually adopt OER in TVET.

OER have the potential of improving availability, access (thereby contributing to more equity), quality and efficiency of TVET, in various ways and in various respects. In the literature reviewed the following (potential) benefits of OER in TVET are mentioned. It concerns mainly **expectations** about the role and impact of OER. In only a few instances evidence is provided, often not more than anecdotal. Furthermore, not all roles and effects mentioned are exclusively valid for OER and open MOOCs.

<u>Availability and access</u>

- OER can freely be used among lecturers and students on ICTs devices such as laptops, personal computers and mobile phones that have Internet access.

- OER address the unequal education and training opportunities due to geographical location, gender and socio-economic factors.
- OER increase access to TVET and provide more flexible options for students by decreasing or removing the need for face-to-face training and thus taking learning to where learners are, supporting part-time as well as full-time options. This is particularly useful for mature students, students in employment and remote students.
- OER increase the options for learners, educators and employers about when, where and how learners can learn.
- OER offer access to the huge numbers of poorly educated and unemployed youth (and refugees) who are 'locked out' of the formal education and training.
- By means of OER it is possible to move beyond the traditional boundaries of formal courses and class-room based leaning to incorporate informal and non-formal learning and to offer opportunities to non-traditional learners and learners in the informal sector.

Quality

- OER contribute to responding better to the needs of teachers for relevant resources to improve their practice. Where teachers lack (technical) knowledge or expertise in specific aspects of a vocational subject, OER can help to bridge the gap.
- OER can provide learners with relevant resources and practical learning experiences that would serve them in their practices.
- Teachers can adopt a learner-centered approach to learning that embraces self-instruction and self-directed and self-paced learning, whereby teachers are enabled to play the role of facilitators of learner-centered learning.
- OER can greatly facilitate teachers' development of new flexible learning approaches in skills education and training.
- OER in open and flexible TVET can increase consistency and assure quality.

Efficiency

- OER offer the potential for teachers and instructors to invest less time in the development of curricula and learning materials for open and flexible TVET and more time in local support and hands-on training and assessment in practical and soft skills.
- OER allow for collaboration among teachers and students to share and edit teaching and learning materials.
- OER allow for collaboration among teachers and companies to share and edit teaching and learning materials.

- TVET teachers embarking on more flexible delivery approaches can access existing content and contextualize it to their own curriculum, thus speeding up the process of materials development.

Most of these (potential) roles and effects have also been mentioned in the survey, the interviews and the virtual conference. In the survey, the value of OER for the development and improvement (of the quality) of teaching and training resources was mentioned the most as important potential contribution of OER for TVET.

As described earlier, TVET covers a wide range of education and training. Various concepts or approaches to TVET are employed around the world, with different roles and concepts in each country, sometimes even within countries. This provides multiple challenges to achieve expansion of access, improving equity, improving status, relevance and quality of TVET. Although OER has the potential to contribute in solving these challenges, this complexity of context influences uptake of OER in a negative sense.

The content of TVET also has some specific characteristics that influence OER adoption:

- The expiration date of knowledge in TVET is short (shorter than in fields like languages, math or history), especially so in IT-driven areas. This puts an extra burden on updating learning materials.

- Much of the content of TVET must comply with professional rules and standards, which differ between sectors and often also between countries. This hampers large international reuse of OER.

From the literature reviewed, on a global scale there emerges a highly uneven pattern of projects and programs: in some countries OER's awareness must still arise, while other countries have formulated policies on OER in TVET (e.g. in the USA the so-called Z-degree programs in Community Colleges). In most projects and programs identified, the main target group in activities to realize mainstreaming OER in TVET are teachers and trainers. Lack of knowledge, skills and competences with regard to OER constrain their ability to adopt and use OER to improve their pedagogical practices and learning outcomes for the students. To acquire those skills, OER can also be used. Therefore, many projects aim at creating awareness and capacity building among teachers and trainers, in countries and institutions. When it comes to such programs, the Commonwealth of Learning (COL) is currently the most important international stakeholder in the field of OER in TVET.

From this study, in particular from programs like INVEST Africa, the Virtual University of the Small States of the Commonwealth and the University of the South Pacific, it may be concluded that adoption of OER in TVET calls for more than a series of one-off interventions, projects or funding. Adoption of OER in TVET requires changes not only in the ways of teaching and training. It also requires institutional policy and capacity planning, most likely also the adaption of organizational structures. It requires innovative staff and teacher development, ICT skills development, and instructional design capacity development (flexible and blended model of TVET, and OER for TVET). And last but not least it requires adequate (ICT) infrastructures. This advocates for programs where adoption of OER is part of a larger innovation program (e.g. the implementation of a flexible and blended learning program).

A too strict focus on adoption of OER is also not recommended for other reasons. The survey has shown that in the reality of TVET, people have in practice a broader view of openness with regard to educational resources for TVET than the OER definition of free plus 5R's permissions as we have used in this study. For learners free access is a very, if not, the most important aspect for use. From a teachers' perspective, however, the rights to re-use, adapt, or to localize, to the needs of specific situations are considered to be important. In order to be able to do this localization, the 5R rights, are necessary. But, given the major challenges facing TVET, it would already be a big step forward when many more educational resources become freely available and accessible, even without the 5R rights. This could be a stepping stone towards a broader adoption of OER in TVET. Our study has shown that in TVET practices openness is a continuum ranging from access to freely available materials to the use of OER in the free and 5R's sense. When thinking about policies or capacity building programs to mainstream OER in TVET, a broader view of openness with regard to educational resources for TVET may have advantages.

From the literature reviewed and from the interviews, a general view emerges that governments are to play an important role in adopting OER in TVET. Profound adoption of OER in TVET requires the creation of education and training ecosystems of TVET wherein stakeholders at different levels, institutional, sectoral, national and international, agree, cooperate and share information and resources. Inclusion of and engagement with national government and stakeholders are a prerequisite, and it requires at national level an enabling policy for innovation of TVET in general and adoption of OER in TVET in particular.

Recommendations

Derived from the findings of the literature review, the survey, the interviews and the virtual conference, we have formulated the following recommendations for UNESCO-UNEVOC:

<u>Awareness raising and advocacy</u>

- Foster awareness raising at policy level about the understanding and relevance of OER.
- Improve the understanding and promote the use of open licensing frameworks for educational, learning and training resources in TVET, and encourage the open licensing of educational resources for TVET produced with public funds.

<u>Policy development</u>

- Encourage and reinforce the development of national strategies and policies on OER in TVET.
- Encourage and support practices of development and adaption of OER in TVET, in different cultural contexts.
- Develop models, frameworks and guidelines for policy formulation and implementation with regard to OER for TVET that governments and institutions can use, modify and apply.

<u>Capacity development</u>

- Provide support for capacity building amongst TVET institutions, trainers and educators.

- Provide support for developing guidelines for customizing OER to local/national contexts.

Standards setting

- Develop guidelines for policy formulation for governments and institutions.
- Provide support for building systems for quality assurance of OER in TVET and for harmonizing existing quality systems.

Partnerships and cooperation

- Foster strategic alliances with various stakeholders in the public and private spheres.
- Encourage research on OER for TVET.

One approach that would be feasible is to systematically collect information about 'good practices' of OER for TVET. These good practices can be a starting point for implementing the formulated recommendations.

These recommendations are in line with those drawn at 2nd OER World Congress in Ljubljana in September 2017 which have resulted in the Ljubljana OER Action Plan 2017. Under the theme "OER for Inclusive and Equitable Quality Education: From Commitment to Action", the congress finalized an Action Plan for lowering barriers that hinder mainstreaming OER, including building capacity of users to find, re-use, create and share OER and developing supportive policy environments.

More general recommendations, not necessarily linked to UNESCO-UNEVOC, apply to collaboration and cooperation and an approach to widen adoption of OER in TVET.

Collaboration and cooperation

Collaboration between institutions in the public and private spheres can make the development of OER more sustainable, since use can be made of an extensive range of knowledge, skills and experiences and the credibility of the training materials can be enhanced. Therefore, organize, start with or intensify cooperation and collaboration (e.g. via consortia) with important stakeholders in the field of OER in TVET: Commonwealth of Learning, International Labor Organization, World Bank, Asian, African and Latin American Development Banks, Organisation for Economic Cooperation and Development (OECD).

Approach

Embed activities on adoption of OER in TVET in larger programs using ICT to innovate TVET. In these programs, address institutional strategy and policy, organisational structures, ICT infrastructure management and teaching and learning to realize a fertile environment for effective use and supply of OER.

National and international repositories of training materials and case studies of good practices can be created. National and international "OER-TVET champions" should be featured to motivate, mentor and enable teachers to develop their eLearning capacities.

Organize systematic gathering of information and evidence base through research, monitoring and evaluation in ways that are participatory and inclusive. In particular, gathering evidence about the costs effectiveness of adoption of open licensing arrangements and harvesting existing OER. This is important information for institutions making strategic decisions to increase their levels of investment in the design and development of better educational TVET.

Together with the International Labor Organization, start a feasibility experiment for standardization of country-based occupational standards to a more global standard. For this experiment, take an area which is already operating internationally and, for reasons of security or insurance, is already heavily standardized.

Finally, some closing remarks. So far, global OER research and the global OER community have focused heavily on higher education and, more recent, on college education. There is still insufficient attention for TVET and the specific issues and challenges involved. Our assumption is that if the open education movement does not pay more attention to OER in and for TVET, OER will broaden the gap between those who have access to quality education and those who don't. Furthermore, based on previous studies and experiences, there is a real danger that OER is considered to be a "silver bullet" for all challenges TVET is facing. This requires careful management of expectations to avoid disappointment among stakeholders.

1 OER and TVET, conceptual issues

1.1 Introduction: motivation, assignment and reading guide

Open Educational Resources (OER) and Technical and Vocational Education and Training (TVET) are two worlds of which the combination can contribute much to the realization of UNESCO's Social Development Goal (SDG) 4, which is "to ensure inclusive and equitable quality education for all and promote lifelong learning opportunities"[2].

Technical and Vocational Education and Training (TVET) is understood "to be integral to education and lifelong learning and to refer to all forms of learning of knowledge, skills and attitudes relating to the world of work. TVET comprises education, training and skills development activities relating to occupational fields, production and livelihoods" (UNESCO, 2015d:8).

OER are "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work." (UNESCO, 2012).

ln May 2015, the Qingdao declaration advocated for the use of technology in education (including vocational education) to achieve SDG4. The Declaration detailed expectations with respect to OER: "Open Educational Resources (OERs) provide education stakeholders with opportunities to improve the quality of, and expand access to, textbooks and other forms of learning content, to catalyze the innovative use of content, and to foster knowledge creation. We commit to developing sector-wide strategies and capacity building programs to fully realize the potential of OERs to expand access to lifelong learning opportunities and achieve quality education." (UNESCO, 2015a).

At the 2nd OER World Congress in Ljubljana in September 2017 an Action Plan for Mainstreaming OER in support of SDG 4 has been accepted. This Plan has been the starting point for a Recommendation for future international collaboration in the field of OER, to be prepared by UNESCO and its Member States before the 2019 session of the General Conference.

It is within this context that UNESCO-UNEVOC commissioned a study with the aim to understand better the specific role of Open Educational Resources and Open Education in Technical and Vocational Education and Training (TVET) and to provide Member States and UNESCO, in particular UNESCO-UNEVOC, with recommendations to support the creation and the use of OER in TVET. In line with UNESCO's new TVET strategy (2016-2021), this study intends to fill the gap both on mapping the landscape of the use of OER and open practices in the field of TVET.

The study was conducted during the period June – November 2017. The final report has been produced in February 2018. The data collection in the study has consisted of three strands:

- Strand 1: Literature review
- Strand 2: Survey

[2] http://www.un.org/sustainabledevelopment/education/

- Strand 3: Interviews with TVET experts

Sub-reports have been written for each of the three strand, are available separately and can be read independently from this report.

Additionally, a virtual conference was organized by UNESCO-UNEVOC in November 2017 to collect more experiences and opinions on some topics of this study. The findings of this conference are included into this report. Details of the virtual conference are described in appendix 1.

Reading guide

This report provides the thematic synopses of the findings of the three strands and the virtual conference on the following subjects:

- Approaches and practices of OER in TVET (chapter 2)
- OER policies in TVET (chapter 3)
- Challenges for mainstreaming OER in TVET (chapter 4)
- Need for cooperation on OER in TVET between stakeholders and internationally (chapter 5)
- Conclusions and recommendations (chapter 6)

The remainder of this chapter clarifies conceptual issues such as the terminology used and the approach taken in this study. People interested in more detailed information are referred to the separate sub-reports of the strands, using the unique codes in this report which refer to the specific passages in the sub- reports. In the literature review, these codes are sequentially numbered paragraphs; in the other two sub-reports, these codes can be found placed in between brackets () in the title of the (sub) chapters. Both the survey report and the interview report contain a table of contents at the beginning, where these codes can be found.

1.2 Contextualizing OER for TVET

Marope, Chakroun and Holmes (2015) have observed that TVET is rising to the top in global debates about, and government priorities for, education and national development and in the strategic and operational priorities of regional economic communities. TVET is ascribed a special role in sustainable development: "Since education is considered the key to effective development strategies, technical and vocational education and training (TVET) must be the master key that can alleviate poverty, promote peace, conserve the environment, improve the quality of life for all and help achieve sustainable development" (UNESCO-UNEVOC, 2004:1). But, as Marope, Chakroun and Holmes (2015) also have pointed out, the sector's capacity to meet the demands being placed upon it is often limited. Therefore, according to the authors, simply scaling up TVET provision in its current forms is not only unlikely to be feasible, but also unlikely to be an adequate response to meet demand and that the nature and roles of TVET systems in contributing to more equitable and sustainable holistic development will require their continuous transformation and expansion. Information and communication technologies (ICT) can be a driver for and a means of this needed change of TVET. ICT has the potential to improve access to, and quality of, learning, increase efficiency, reduce costs, foster innovation, make teaching and learning more relevant to people's work and lives and prepare individuals to become lifelong learners (Latchem, 2017a; Mead Richardson, 2009).

OER are seen as appropriate ICT-based means to address one of the big challenges TVET is facing, particularly in developing countries: no or insufficient access to or lack of good learning. According to UNESCO (2015d), it is for this reason that OER have been adopted by an increasing number of countries to solve this problem, amongst others: Antigua, Barbuda, India, Mauritius, and South Africa. Open textbooks (e.g. Canada and the Eastern Caribbean), multi-lingual OER, and OER that are integrated in MOOCs are other noteworthy trends.

In all studies under review in which OER in relation to TVET are dealt with, TVET is ascribed a special role in sustainable development explicitly and sometimes implicitly, which is in line with the Bonn Declaration of UNESCO-UNEVOC: "Since education is considered the key to effective development strategies, technical and vocational education and training (TVET) must be the master key that can alleviate poverty, promote peace, conserve the environment, improve the quality of life for all and help achieve sustainable development". (UNESCO-UNEVOC, 2004:1).

1.3 Defining Open Educational Resources (OER)

The concept of open content was first used and defined by David Wiley in 1998. While it was a term that referred to all types of content, Wiley was mainly thinking of educational content (Wiley, 2018). In 2001, when MIT decided to make much of its educational content freely available on the web under an open license, it chose the term OpenCourseWare for that content. The term Open Educational Resources (abbreviated to OER) was adopted at the UNESCO's 2002 "Forum on the Impact of Open Courseware for Higher Education in Developing Countries" (UNESCO, 2002) and has since then become the term most used.

In the Declaration of the "First World OER Congress" in Paris in 2012, organized by the Commonwealth of Learning (COL) and UNESCO, OER have been defined as "teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work." (UNESCO, 2012).

Creative Commons (CC) licenses[3] have become the most widely used license model for OER. These licenses provide a legal framework for the sharing, adaptation and re-use of educational resources.

In the 2012 Paris OER Declaration, States are recommended to facilitate the use of OER and create enabling environments by developing appropriate strategies and policies, build capacity, encourage development and adaptation of OER, and to encourage the open licensing of educational materials produced with public funds. As a follow-up, in 2017 the 2nd OER World Congress was organized in Ljubljana. Under the theme "OER for Inclusive and Equitable Quality Education: From Commitment to

[3] https://creativecommons.org/

Action", the congress finalized an Action Plan for lowering barriers that hinder mainstreaming OER. The Action Plan entails the following five strands[4]:

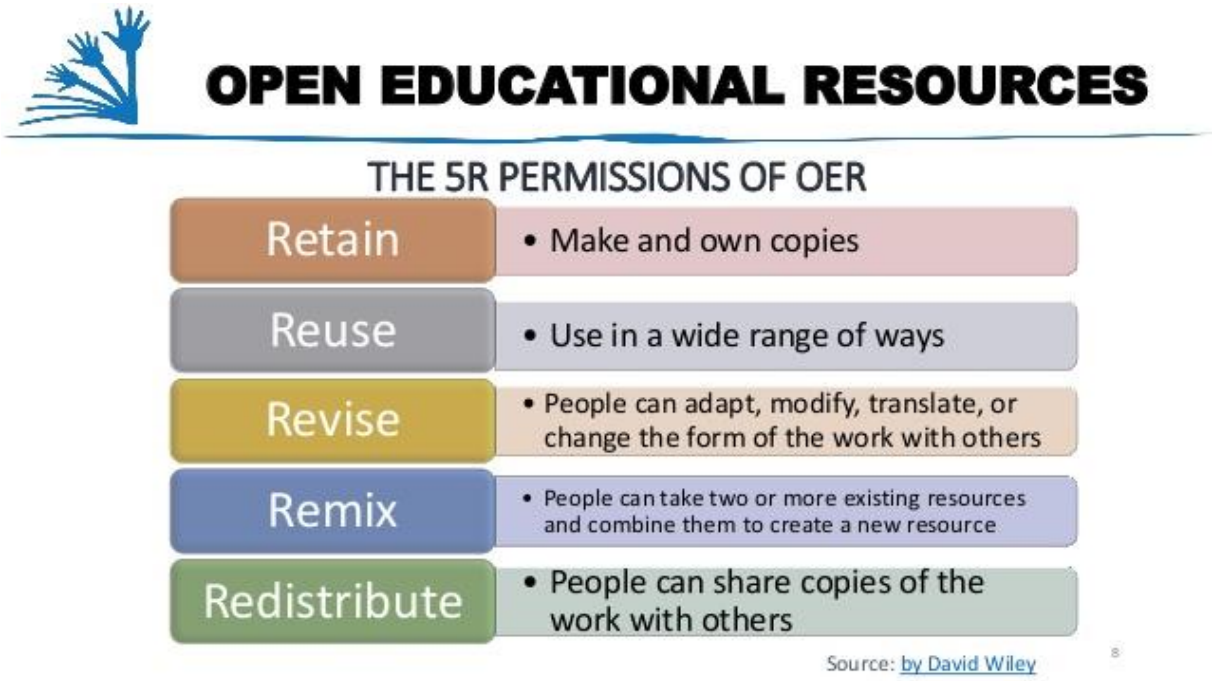
- Building the capacity of users to find, re-use, create and share OER
- Language & Cultural issues
- Ensuring inclusive and equitable access to quality OER
- Developing sustainability models
- Developing supportive policy environments.

The five most commonly exploited freedoms by OER adopters under Creative Commons licenses are formulated as "5Rs"[5]:

- Retain - the right to make, own, and control copies of the content (e.g., download, duplicate, store, and manage)
- Reuse - the right to use the content in a wide range of ways (e.g., in a class, in a study group, on a website, in a video)
- Revise - the right to adapt, adjust, modify, or alter the content itself (e.g., translate the content into another language)
- Remix - the right to combine the original or revised content with other material to create something new (e.g., incorporate the content into a mashup)
- Redistribute - the right to share copies of the original content, your revisions, or your remixes with others (e.g., give a copy of the content to a friend)

In this study OER are referred to as "free" and "open" as defined by these 5R's. The following picture provides a graphical representation[6].

[4] https://en.unesco.org/sites/default/files/ljubljana_oer_action_plan_2017.pdf
[5] http://opencontent.org/definition/.
[6] CC-BY Carmelo Branimir España Villegas, Manuel Caeiro Rodriguez
https://www.slideshare.net/oeconsortium/technology-adoption-in-education-challenges-to-create-and-share-with-the-oer-ecosystem



OER include (OECD, 2007):

- Learning Content: full courses content modules, learning objects, collections and journals.
- Tools: software to support the development, use, re-use and delivery of learning content including searching and organization of content, content and learning managements systems, content development tools, and on-line learning communities.
- Implementation resources: intellectual property licenses to promote open publishing of materials, design principles of best practices, and localisation of content.

1.4 Massive Open Online Courses (MOOCs)

MOOCs are online courses designed for large numbers of participants, which can be accessed by anyone anywhere as long as they have an internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free (Jansen et al, 2015). Initially, two types of MOOCs could be distinguished. In cMOOCs, learners are encouraged (though not required) to contribute actively via blog posts, tweets or other social media posts that are aggregated online by course organizers and shared with all participants via email or newsletters. The "c" stands for "connectivist" and the course approach is typically that learners pursue their own learning outcomes with a focus on community and connections. xMOOCs, on the other hand, resemble traditional courses and more traditional higher education teaching methods. Pre-recorded video lectures and scalable forms of assessment are provided to learners who can interact in pre-set forums in a single platform rather than creating and/or sharing distributed content on the Web outside the platform. However, since its rise started in 2012, a wide variety of types of MOOCs have emerged, using different pedagogies.

MOOCs are being taken into account in this study in so far as educators and education institutions are allowed to use and reuse the educational resources of the MOOC freely with the 5R permissions.

1.5 OER as element of Open Education

According to Bates (2015), Open Education can take a number of forms:

- education for all: free or very low cost school, college or university education available to everyone within a particular jurisdiction, usually funded primarily through the state;
- open access to programs that lead to full, recognized qualifications. These are offered by national open universities or more recently by the OER University (OERu)[7];
- open access to courses or programs that are not for formal credit, although it may be possible to acquire badges or certificates for successful completion. MOOCs are a good example;
- open educational resources (OER) that instructors or learners can use for free. MIT's Open Courseware, which provides free online downloads of MIT's video recorded lectures and support material, is one example; MOOCs can have the form of OER
- open textbooks, online textbooks that are free for students to use;
- open research, whereby research papers are made available online for free downloading;
- open data, that is, data open to anyone to use, reuse, and redistribute, subject only, at most, to the requirement to attribute and share.

One can add to this list (Wiley, 2014):

- open technologies, that is technologies which facilitate people to access, use, reuse, and redistribute open content, such as repositories and referatories
- open pedagogies or open teaching practices
- open learning
- open assessments
- open credentials

All these components make 'open educational practices' possible: 'practices which support the (re)use and production of OER through institutional policies, promote innovative pedagogical models, and respect and empower learners as co-producers on their lifelong learning path' (Conole & Ehlers, 2010:4). In this study however, we look broader to encompass all activities that open up access to education and training by means of openly available online content and/or services.

We have taken this broader view in order to include the different approaches to open education, which are taken by institutions and governments. With this approach we are in line with for example the Cape Town Open Education Declaration, which states that 'open education is not limited to just open educational resources. It also draws upon open technologies that facilitate collaborative, flexible learning and the open sharing of teaching practices that empower educators to benefit from the best ideas of their colleagues. It may also grow to include new approaches to assessment, accreditation and collaborative learning' (Cape Town Open Education Declaration, 2007)[8].

[7] https://oeru.org/
[8] http://www.capetowndeclaration.org/

1.6 Defining TVET

TVET is understood "to be integral to education and lifelong learning and to refer to all forms of learning of knowledge, skills and attitudes relating to the world of work. TVET comprises education, training and skills development activities relating to occupational fields, production and livelihoods. Transversal skills, citizenship skills and skills that enable lifelong learning are integral components of TVET. (…) TVET also encompasses continuing training and professional development undertaken as part of in-service arrangements or individual and collective initiatives." (UNESCO, 2015c).

TVET, as considered in this study, includes education and training delivered at different levels within the education system—secondary, postsecondary, and tertiary. It is provided in schools and technical institutes within the formal education system, in dedicated training centers outside the formal education system, and on the job in both the formal and informal sector (e.g., traditional apprenticeships). It is provided in separate training institutions, in parallel with general education, and integrated with general education in schools. TVET is provided within polytechnic institutions, and in institutions supported by nongovernment organizations, church agencies, and for-profit organizations.

An important part of TVET is about skills development. Following UNESCO (1984) skills are defined as the relevant knowledge and experience needed to perform a specific task or job and /or the product of education, training and experience which, together with relevant know-how, are the characteristics of technical knowledge[9]. Skills give a person the ability to perform a particular mental or physical activity that may be developed through vocational training or practice (NCVER, 2017).

TVET training programs may last for a few days or for 3-to-4 years. The clientele may be youths for pre-employment training or continuing training, or adults for upgrading or retraining. It may be given full-time, part-time, or on block release. In short, TVET provision is heterogeneous and complex (ADB, 2008).

TVET programs and courses can be delivered by face-to-face, hands-on, computer-based, online or blended teaching and learning. The programs and specific forms of provision depend upon the governing structures, constitutional provisions, economic and social needs, stakeholder interests and other prevailing circumstances in each particular country.

The focus in this study is on TVET at the ISCED levels 2, 3, 4 and part of 5, both in formal, non-formal and informal settings[10].

1.7 Approach taken in the study

As already indicated in paragraph 1.1, the study has consisted of four ways of collecting data and information:

1. Literature review
2. Survey
3. Interviews with TVET experts

[9] http://www.unevoc.unesco.org/go.php?q=TVETipedia+Glossary+A-Z&filt=all&id=422

[10] http://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf

4. Virtual conference

Furthermore, a presentation of preliminary results was given during the 2nd World Congress on OER in Ljubljana in September 2017. The presentation was based on a draft report with preliminary results from the literature review, survey and interviews. The discussions around this presentation provided us with additional information, which is added to this report.

Literature review

The literature review was developed through an extensive and systematic research. Scope of this research has been the identification of relevant and publicly available articles, book chapters, reports and program documents on the question as to what evidence is available with regard to the relevance of OER and OER/MOOCs in TVET. To conduct this literature review the following process was followed:

- 22 collections of publications have been identified.
- These sources have been searched on the terms: TVET or "Technical and Vocational Education and Training", OER or "Open Educational Resources", MOOC or "Massive Open Online Courses", (TVET or "Technical and Vocational Education and Training") and (OER or "Open Educational Resources"), (TVET or "Technical and Vocational Education and Training") and (MOOC or "Massive Open Online Courses"), OER and "Skills Development", MOOC and "Skills Development".
- Results were limited to publications in English, published in the time span of 2002-2017.

The results:

- The initial search identified 770 papers, reports, program documents and book chapters
- A further examination of the abstracts of these papers, reports and book chapters, and when available full texts limited the initial collection to 45 publications under the restrictions: published in English language, online accessible and retrievable, and "OER/MOOC and TVET" as issues referred to. The collection of publications was supplemented with articles and reports mentioned in references in the initial 45 publications and which after reading seemed relevant. Ultimately this has resulted in a total list of 61 publications. This list was adopted on July 25, 2017 and has not been modified since then.
- All 61 publications have been included in the review. Of these 61 publications, not every article, report or book chapter contained information about 'OER/MOOC and TVET' or on 'OER/MOOC and Skills Development'. The analysis made clear that sometimes only the terms of OER and/or MOOC in relation to TVET and/or Skills Development were mentioned without any further elaboration, while the actual subject was on e.g. Open and Distance Learning, or on TVET and ICTs, or on TVET and educational policies.

In the remainder of this report, we will use the terms "OER for TVET" for referring to OER, respectively "MOOC for TVET" for referring to MOOCs.

The detailed results of this final review are presented in a separate report "Report literature review OER in TVET", where the full list of references can also be found.

Limitations of this method were:

- Only the English terminology for OER and TVET was used and only publications in English were taken into consideration;
- Alternative formulations for TVET (e.g. Career and Technical Education) and OER were not taken into account;
- Only MOOCs where the content was available under an open license that allows the 5R permissions were taken into account;
- Only publications from 2002-2017 were taken into consideration;
- No systematic search into grey literature (such as working papers and blog posts) has been conducted.

Survey

The aim of the survey has been to collect data on evidence for the practices of creation and use of OER in TVET and the support stakeholders are providing. The survey took place largely while the literature review was still taking place. The questions asked in the survey could therefore not be based on the results of the literature review. Instead, the Terms of Reference for this study have been used as the basis for the topics and questions to be dealt with in the survey.

The questions are divided into 3 chapters:

1. General. Information about institution, country, position and expertise of OER and TVET (7 questions)
2. Use. Practices about creation, use and impact of OER in TVET (9 questions)
3. Support. Practices about supporting policies and activities for creation and use of OER in TVET (10 questions)

Questions in the chapters Use and Support are both open-ended and closed questions. All questions in the General chapter are mandatory to fill in. All other questions are non-mandatory.

When relevant, respondents could provide answers from a national viewpoint and from an institutional viewpoint. Respondents were able to decide for themselves which of the viewpoints (one or both) they were having sufficient knowledge about for their responses. This viewpoint could be determined per question. For example, a respondent was able to answer a question from a national viewpoint and answer the next question from both viewpoints.

The survey was online available from 3 July 2017 to 7 August 2017. Respondents were targeted via a message in the UNESCO-UNEVOC TVET forum[11] on 3 July 2017. Reminders were posted in this forum on 18 July and 31 July. Additionally, several twitter messages were sent out, and stakeholders in the UNEVOC Network were emailed individually to get their attention on the survey. Some of the stakeholders reported spreading the call for respondents among their network. This means that it is not possible to determine how many people were initially approached to participate. Therefore, it is not possible to determine the response ratio.

[11] http://www.unevoc.unesco.org/go.php?q=e-Forum+-+Message+Board&skin=efor&lang=en&action=threadlist&thread=3744

Ultimately, 349 responses are received, of which 257 (73.6%) are usable for analysis. Of these usable responses, 181 (70.8%) respondents had fully completed the survey.

The detailed results of the survey can be found in a separate report “Report survey OER in TVET”.

Limitations of this method were:

- The findings of the survey are self-report data: responses can relate to actual situations, but can also be socially desirable answers
- Responses are not evenly spread around the world. Generalization of results of this survey, especially to regions that have no or a low number of responses (South America, North Arica, the Nordic in Europe), should therefore be done with care.
- Participants from the UNESCO-UNEVOC network are unevenly divided among the world, with the majority coming from Africa (30.6%) and Asia (31.9%).
- The survey was only available in English.
- It appeared that 39% of respondents who considered themselves (somewhat) OER expert, never had seen or did not know the meaning of a CC-BY icon.
- In the survey respondents were asked to give their opinions about the potential contribution of OER, and what support is needed for a broad adoption of OER in TVET. When looking at and interpreting the findings of the survey, the reader has to bear in mind the following. It is very likely that respondents in the survey have used a ‘broader’ connotation of OER in their answers than we have defined in this study (see section 1.3).
- Therefore, interpretation of the results of the survey should be done with a broader view of OER in mind than we have defined.
- Also, it may well be the case that in some questions respondents have answered about their expectations instead of actual facts being present. There is no way to find out about what is meant by each respondent.

Interviews

The aim of the interviews was to collect information and data on OER for TVET in addition to the information from the literature review. Predominantly the questions in the interview arose from this literature review. They were meant either to elucidate items from the review or elements not mentioned in the review which we considered to be relevant.

The interviews were semi-structured. Depending on the answers, other questions than on the list have been asked.

To determine the interviewees, a longlist of candidates was constructed. Experts named in literature and persons pointed at by UNESCO-UNEVOC were added to the longlist, as were experts from the network of the two researchers. Selection of the candidates was determined by:

- Spread over the world regions
- Expertise on TVET and OER
- Spread over organizations involved in TVET (public, private, NGO)

From this longlist, a shortlist was devised in close cooperation and agreement with UNESCO-UNEVOC. The candidates on this shortlist were approached by email, in most cases accompanied by a

Letter of Endorsement by UNESCO-UNEVOC. The questions were sent along with the email. Some of the individuals approached did not reply or pointed to colleagues who were (in their opinion) better suited to be interviewed.

Ultimately, 10 interviews were taken in the period 21 July to 23 August 2017, with a duration between 30 and 70 minutes. All interviews were recorded for the purpose of analysis by the researchers only. It was agreed upon that none of the statements would be made traceable to individual interviewees.

The detailed results of the interviews can be found in a separate report "Report interviews OER in TVET".

Limitations of this method:

- Only a limited number of experts was interviewed
- The longlist was only viewed by and discussed with UNESCO-UNEVOC

Virtual conference

The objective of the virtual conference was to inform the wider TVET community about and to discuss with them the general findings of the study. An additional goal of the virtual conference was to share information, experience and knowledge of OER in TVET, to be used as input for the final report as well as into wider UNESCO practices.

The virtual conference was held between 9 and 20 November 2017 via the TVET Forum[12]. During the conference, 5 topics were addressed and discussed in the forum. Participants could register for the conference, but that was not mandatory; an account on the TVET Forum was sufficient to gain access to the virtual conference. Participants were asked to introduce themselves on the forum.

The following table provides an overview of the topics and some statistics.

# Registered participants: 204 (equals 3.8% of the total number of registered users of the forum)	
# Countries participants originated from: 57	
Topics	**# Posts**
Introduction of participants	72
Topic 1: How important is openness?	33
Topic 2: Teachers and trainers	30
Topic 3: Collaboration and cooperation with government and private sector	13
Topic 4: Learning from good practices	8
Topic 5: What do you expect from UNESCO-UNEVOC when introducing OER in TVET?	6

Each second day, a new topic was introduced on the forum by an initial statement from the researchers. For topics 1 and 4, a 1 hour webinar was organized. These webinars attracted 13 participants (topic 1), respectively 15 participants (topic 4) (including the two researchers and the moderator from UNESCO-UNEVOC).

[12] http://www.unevoc.unesco.org/go.php?q=e-Forum+-+Virtual+Conferences

During a webinar, participants could discuss with the presenters using chat. The last day, a webinar with a wrap-up of the Conference by the two researchers was organized. This webinar had 12 participants (including the two researchers and the moderator from UNESCO-UNEVOC). Recordings of the webinars were made available on the forum directly after closing.

The findings of this Conference are included in the remainder of this report in the appropriate sections.

Limitations of this method:

- Only members from the UNEVOC network forum had access to the virtual conference.
- Participants were not evenly distributed over the regions: 50% originated from Africa. A possible explanation is that 31% of the ~5350 registered users of the TVET Forum are from Africa.

More details of this virtual conference can be found in Appendix 1.

2 Open Educational Resources for TVET: approaches and practices

2.1 Introduction

In this chapter, we will present an overview of the findings of the literature review, the survey, and the interviews on the subject of existing approaches and practices. We have classified the information obtained into the following topics:

- Overview of approaches and practices
- Role of OER in formal, non-formal and informal TVET
- Role of OER in skills development and training in TVET
- OER for TVET in relation to learners' needs
- OER for TVET, market needs and involvement of the private sector
- National and institutional OER repositories for TVET
- International TVET-OER practices

As already mentioned in section 1.7, both in the literature review as in the survey it often remained unclear whether the finding or statement referred to a realized outcome or effect (**evidence**) or to an expected outcome or effect (**expectation**) of OER. Where we have been able to determine what is the case (evidence or expectation) this is mentioned. Also, the focus of this study was on the use and effects of OER in TVET. In TVET programs and project certain goals, for which OER are used, may also be achieved with instruments other than OER. Determining the relative contribution of OER compared to other instruments has not been a subject of this study.

2.2 Overview of approaches and practices

The literature reviewed shows a highly uneven pattern of projects and programs of OER adoption in and for TVET. Evidence of projects to adopt OER in TVET has been found for countries in Africa, in Asia & the Pacific, in Latin America and the Caribbean. For Europe, North America and Arab States no evidence has been found in the selected literature. In this section we briefly outline the programs and projects that we have encountered in the literature and in which OER for TVET is made and (re)used.

A large program identified is the Innovation in Vocational Education and Skills Training (INVEST Africa) Programme of the Commonwealth of Learning (COL). This program is aimed at capacity building on the premise that flexible and blended learning and teaching approaches can impact positively on the goals of TVET institutions to expand access to quality vocational education and skills development. The dominance of traditional ways of teaching and the slow adoption of ICT-based teaching and learning were seen to be among the critical challenges in transforming African TVET. OER are seen as key technology for educating and training teachers, for enabling them to access relevant materials and expertise and enabling them to exchange materials (Isaacs, 2017). By November 2017 INVEST Africa comprised more than 90 partner institutions in seven African countries: Kenya, Uganda, Tanzania, Ghana, Nigeria, Zambia and Mozambique[13].

[13] https://www.col.org/programmes/technical-and-vocational-skills-development/invest-africa

OER Africa is another initiative relevant for this study. OER Africa was established by the South African Institute for Distance Education (SAIDE) to drive the development and use of OER across all education sectors on the African continent. Three communities have been formed: (1) AgShare , aimed at ensuring teaching of agriculture is geared to respond to the real life experiences and expectations of the farmers in the field; (2) ATEN, the African OER Teacher Education Network, aimed at teachers, and (3) African Health OER Network which seeks to enable participants to develop, adapt, and share open health education resources (OER) within and between African institutions to augment limited human and other resources in the health sector and impact positively on overall health provision in Africa and beyond (Adala, 2016)[14].

The third program that we have encountered concerns the Virtual University for Small States of the Commonwealth (VUSSC), a Commonwealth organization that amongst other gives guidance on the adoption of OER. The VUSSC network represents 32 small states of the Commonwealth dedicated to expanding access to tertiary education. VUSSC's course materials are non-proprietary and readily adaptable to the specific context of each country. They can be used in the offering of credit-bearing qualifications as well as strengthening educational capacity and access in member countries (Modesto, 2016). VUSSC countries have specifically chosen to focus on the development of post-secondary, skills-related courses and programs in areas such as tourism, entrepreneurship, use of information and communications technologies, life skills, disaster management, fisheries, construction management, transportation and logistics, agriculture and business and entrepreneurship. Another component of the VUSSC initiative has been the development of a Transnational Qualifications Framework (TQF) that is meant to give a transnational framework of quality assurance and qualification recognition[15].

OER have also been used as instruments for achieving more open and flexible TVET in nine Pacific Commonwealth countries: Fiji, Kiribati, Nauru, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu (Neal, 2011). In this program, Commonwealth of Learning is again an important actor. OER are regarded as an important part of their education strategies. TVET OER courses have been developed in a range of subjects, including horticulture, painting, sewing, permaculture, community development, bookkeeping and working with concrete. These are all being delivered in different countries and further subjects are in development. The materials developed offer the potential for Pacific TVET instructors to invest less time in the development of curricula and learning materials for open and flexible TVET and more time in local support and hands-on training and assessment in practical and soft skills (Neal, 2011; Coghlan, 2016).

The TVET Academy, a French non-profit NGO, is another actor who uses freely available resources as instrument for achieving better and more accessible TVET. The TVET Academy is the continuation of a successful training project in Cambodia that was implemented by the NGO Connected Schools, in which video recordings for online and offline use were used to support TVET training institutions. They were amongst others in the subjects of motorbike repair, sewing, hair dressing, house wiring, electrical welding, pig raising and financial education. The Cambodia project ended in May 2014 with an official transfer to the Cambodian Ministry of Education and Vocational Training (Mabille, 2017).

[14] http://oerafrica.org/overview
[15] https://www.col.org/programmes/vussc/virtual-university-small-states-commonwealth-vussc

Since then, the TVET Academy has been active in Paraguay in partnership with Fundacion Paraguay[16]. In 2017 a pilot project was run throughout 30 agricultural schools in partnership with the Ministry of Education in which more than 500 students were involved[17]. Most of the learning materials developed are OER and available at the repository of the TVET Academy.

The above projects and programs are all international projects, driven by international actors. In two of them the Commonwealth of Learning (COL) plays a central role. No examples of local and national projects and programs were mentioned in the literature reviewed. The latter does not mean that such projects and programs would not exist. It only means that they have not been subject of research in the reviewed (English) international literature.

Te main group targeted are teachers and trainers. The line of thought that is evidently followed is the following: OER can be useful for training skills in a specific domain. To be able to realize that benefit, educators and trainers must have the skills to publish, find and adapt OER. To acquire those skills, OER can be used. Therefore, many projects are focused on awareness raising and capacity building among teachers, and for this OER are seen as important instruments.

The subjects covered in the projects and programs identified cover a broad range of domains: water management, agriculture, basic trading, nursery, healthcare, batik printing, mobile phone repair, bookkeeping and administration and management of TVET are some of the examples we have come across. Educational levels range from ISCED level 3 up to ISCED level 6 and 7.

In the survey, respondents mention images (73%) and presentations (70%) as the most used types of OER on national level and presentations and videos (both 83%) as most used types of OER on institutional level. Since TVET is predominantly skills development, with these types of resources skills can be demonstrated the best.

The Commonwealth of Learning (COL) is the organisation most involved in the projects identified.

More details
Literature review report: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 43, 44, 57, 58, 59, 60, 61, 62, 63, 64, 66, 67, 69, 70, 71, 72

Survey report: U2

Interview report: R4

2.3 Role of OER in TVET

OER have the potential of improving availability, access and quality of TVET, in various ways and in various respects. In the literature reviewed, (Isaacs, 2017; Adala, 2016; Coghlan, 2016; Konayuma, 2013; Koroivulaono & Shashi Kerishma, 2013; Herd & Mead Richardson, 2012; Neal, 2011) several benefits of OER in TVET are mentioned.

[16] http://www.fundacionparaguaya.org.py/?lang=en
[17] https://www.mec.gov.py/cms/

In the literature review the focus has been on OER and open MOOCs (free and 5R's). Below we give an overview of what we have found in the literature about the role and effects of OER. Please note that not all roles and effects mentioned are exclusively valid for OER and open MOOCs! Also, the findings from literature and the survey concern mainly expectations about the role and impact of OER. In only a few instances evidence for realization of these expectations is provided, often not more than anecdotal.

Access/equity

- OER address the unequal education and training opportunities due to geographical location, gender and socio-economic factors.
- OER increase access to TVET and provide more flexible options for students by decreasing or removing the need for face-to-face training and thus taking learning to where learners are and supporting part-time as well as full-time options.
- OER offer access to the huge numbers of poorly educated and unemployed youth (and refugees) who are 'locked out' of the formal education and training.
- By means of OER, it is possible to move beyond the traditional boundaries of formal courses and class-room based leaning to incorporate informal and non-formal learning, and to offer opportunities to non-traditional learners and learners in the informal sector.

Quality

- OER contribute to responding better to the needs of teachers for relevant resources to improve their practice. Where teachers lack (technical) knowledge or expertise in specific aspects of a vocational subject, OER can help to bridge the gap.
- Usefulness OER are useful and freely available resources of teaching and learning materials for learners. They can provide learners with relevant resources and practical learning experiences that would serve them in their practices.
- By means of OER new potential students, particularly mature students, students in employment and remote students can be reached.
- OER can freely be used among lecturers and students on ICTs devices such as laptops, personal computers and mobile phones that have Internet access.
- Teachers can adopt a learner-centered approach to learning that embraces self-instruction and self-directed and self-paced learning, whereby teachers are enabled to play the role of facilitators of learner-centered learning.
- OER can greatly facilitate teachers' development of new flexible learning approaches in skills education and training.

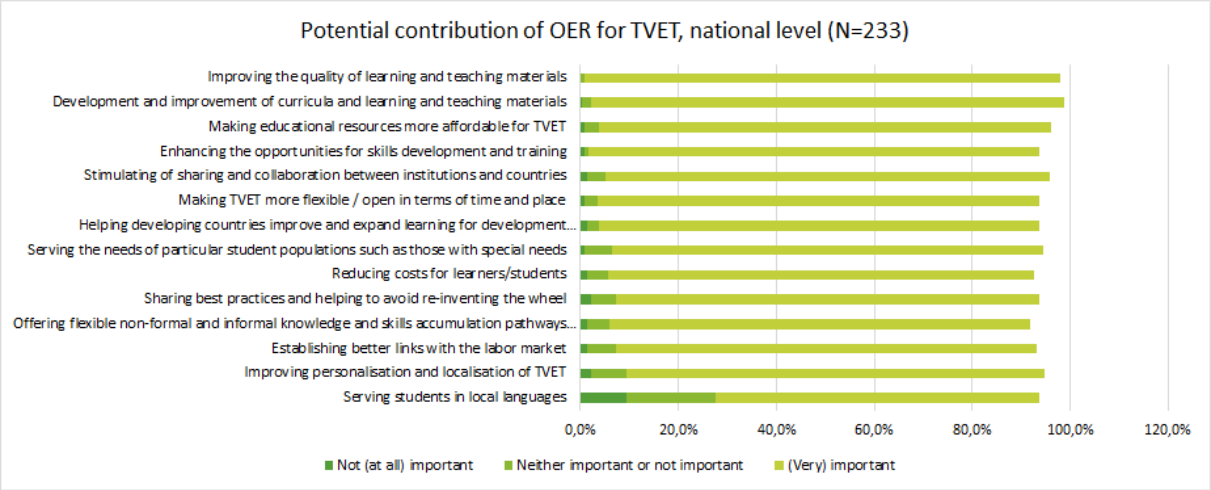
Efficiency

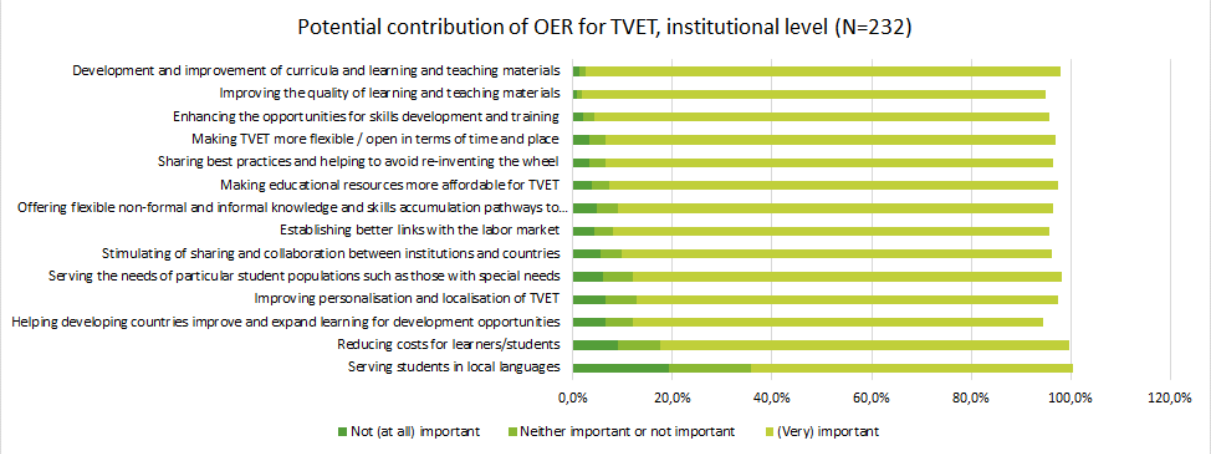
- OER offer the potential for teachers and instructors to invest less time in the development of curricula and learning materials for open and flexible TVET and more time in local support and hands-on training and assessment in practical and soft skills.
- OER allow for collaboration among teachers and students to share and edit teaching and learning materials.
- OER allow for collaboration among teachers and students to share and edit teaching and learning materials.

Governance and management

- OER in open and flexible TVET can increase consistency and assure quality.
- OER increase the options for learners, educators and employers about when, where and how learners can learn.
- TVET teachers embarking on more flexible delivery approaches can access existing content and contextualize it to their own curriculum, thus speeding up the process of materials development.

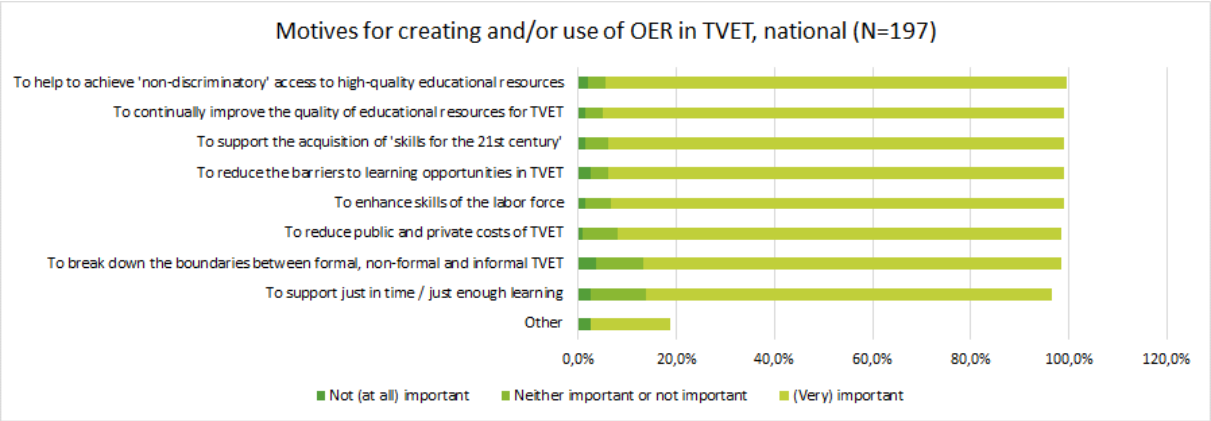
In the survey, development and improvement (the quality) of curricula and learning and teaching materials are mentioned the most as a (very) important **potential contribution** of OER[18] for TVET (97% from national level and 95% from an institutional viewpoint).



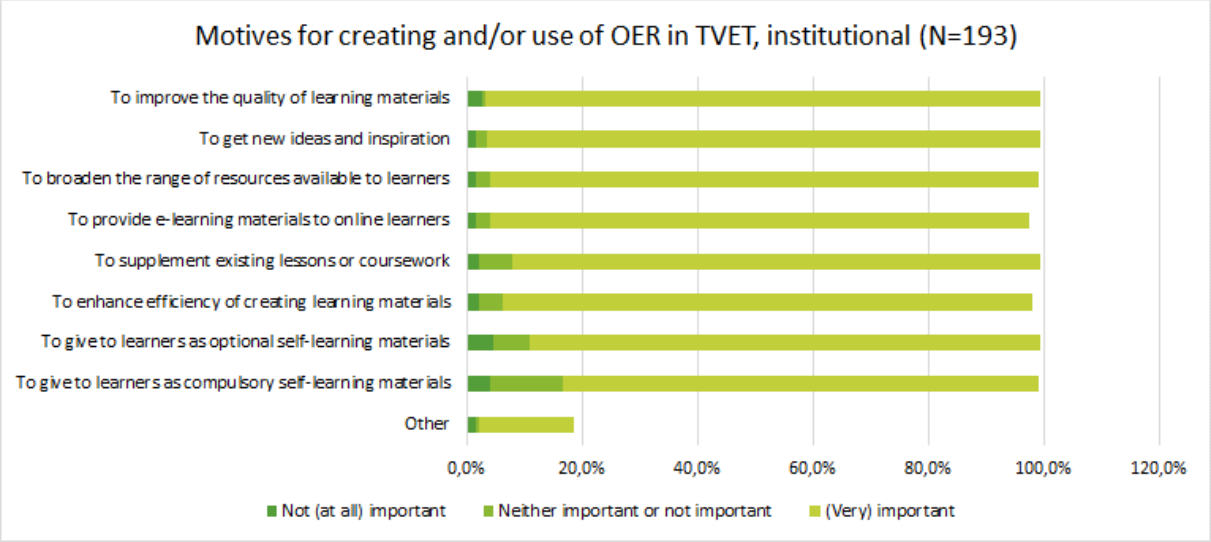


From a national viewpoint, improving the quality of learning and teaching materials and to help to achieve 'non-discriminatory' access to high-quality educational resources are considered the most as a (very) important motive for **creating and/or using** OER for TVET (both 94%).

[18] As indicated in section 1.7, in reading and interpreting the findings the reader has to bear in mind that most likely respondents have used a broader connotation of OER than 'free plus 5R's



From an institutional viewpoint, improving the quality of learning and teaching materials and to get new ideas and inspiration are considered the most as a (very) important motive for creating and/or using OER for TVET (both 96%).



For 85% of the respondents in the survey an important motive for adoption of OER in TVET was that it would give opportunities to break down the boundaries between formal, non-formal and informal TVET. This could for example be realized by closer collaboration between colleges and employers in developing and evaluating OER, or by offering flexible non-formal learning and training courses by means of OER that can lead to formal recognition.

These findings are backed by opinions of the experts interviewed. They stressed the value of OER for TVET because:

- TVET involves often relatively more expensive forms of education and training. In many situations OER offer the opportunity of extending more equally access to the educational resources of TVET;
- Especially videos are important means to realize this;
- OER may increase efficiency, for instance when (short) courses are shared among institutions;

- OER may lead to quality improvement of the educational resources when used by teachers: OER may imply improvement of their own technical knowledge and providing updated learning resources to learners.

More details

Literature review report: 27, 30, 57, 62, 66, 70, 71, 74

Survey report: U0, U4, U5

Interview report: R2, R5

2.4 Role of OER in skills development and training in TVET

Skills development and training is central to TVET. Therefore, it is no wonder that in the projects and programs found in the literature reviewed, skills and knowledge, which are required at the workplace get primal attention. OER can help to develop the knowledge, skills and competences need. OER can also be beneficial to trainers and teachers allowing them to tap into training courses or elements of these courses from others, in order to update their own knowledge and skills or to provide to learners.

Here we summarize the cases found in the literature reviewed of how new skills and competences in different fields can be acquired by using OER (and MOOCs). For details, the reader is referred to the relevant passages in sub-report Literature Review.

In a case study of a program for upgrading teachers' skills in India, Kanvaria (2013) described how about thirty teachers were trained to use OER. About the role of OER, the author asserted that "OER are very fruitful for teachers and teacher educators, who are in a position to interact face to face with resource person and field experts. They have several difficulties in teaching and learning, while are at their workplace. Provide them free and almost without boundaries platforms to be in touch with the experts " (Kanvaria, 2013, 3-4). No factual information was provided to substantiate the assertion.

In an exploratory study of the future demand for ICT support staff, Varis (2003) indicated that the future demand will increase strongly, not only in numbers but also in terms of skills and competences needed. He pointed out that ICT staff will need more and more skills and competences in different fields such as ICT-literacy. These new skills and competences can be acquired in small modules and lifelong learning environments using open educational resources (OER) and through cooperation with the industry and SMMEs." (Varis, 2003: 110). Again, no factual information was provided to substantiate the assertion about the role of OER in upgrading skills and competences.

In an evaluative study of the INVEST Africa program, Isaacs (2017) has pointed to the benefits of this program for teachers: they have been able to learn new teaching skills, amongst others the skills to produce and re-use OER.

In a report by Adala (2016) on the state of advancement of OER in Kenya, part of a series by the UNESCO Institute for Information Technologies in Education (UNESCO IITE) on best practices in OER

in non-English-speaking countries, an overview of regional and international projects implemented in Kenya at national and institutional level is given. The report contains the results of the analysis of challenges for the promotion of OER and Open Educational Practices (OEP) in Kenya, ranging from copyright issues to awareness and preparedness of main stakeholders to produce and use OER. The study found the following examples of OER developed by TVET Institutions in Kenya. COL in partnership with a number of Kenyan TVET institutions, developed various non-formal community training courses through the INVEST Africa Program of COLs Technical and Vocational Skills Development (TVSD) Initiative: Basic Manicure and Pedicure Skills; Poultry Keeping; Mobile Cell Phone Repair and Maintenance; Producing Interlocking Stabilized Soil Blocks. Other OER projects described in the report are TESSA and OER Africa.

In a COL Vanuatu project, existing OER in Small Engine Maintenance were adapted for skills development and training (Coghlan, 2016). Within the context of the Virtual University for Small States of the Commonwealth (VUSSC) the focus was on creating skills-related post-secondary courses in areas such as tourism, entrepreneurship, professional development, disaster management and a range of other technical and vocational subjects (Modesto, 2016).

Koroivulaono & Shashi Kerishma (2013) reported on vocational programs offered at the University of the South Pacific by the Regional Centre for Continuing and Community Education (RCCCE), which target people in the workforce for up-skilling, re-skilling and multi-skilling for continuous professional development. Shahnewaz (2016) reported on a project in Bangladesh, developed with support from Commonwealth of Learning (COL), in which a new approach to non-formal skills training was developed. Course materials for five trades for neo-literates were developed and disseminated as OER.

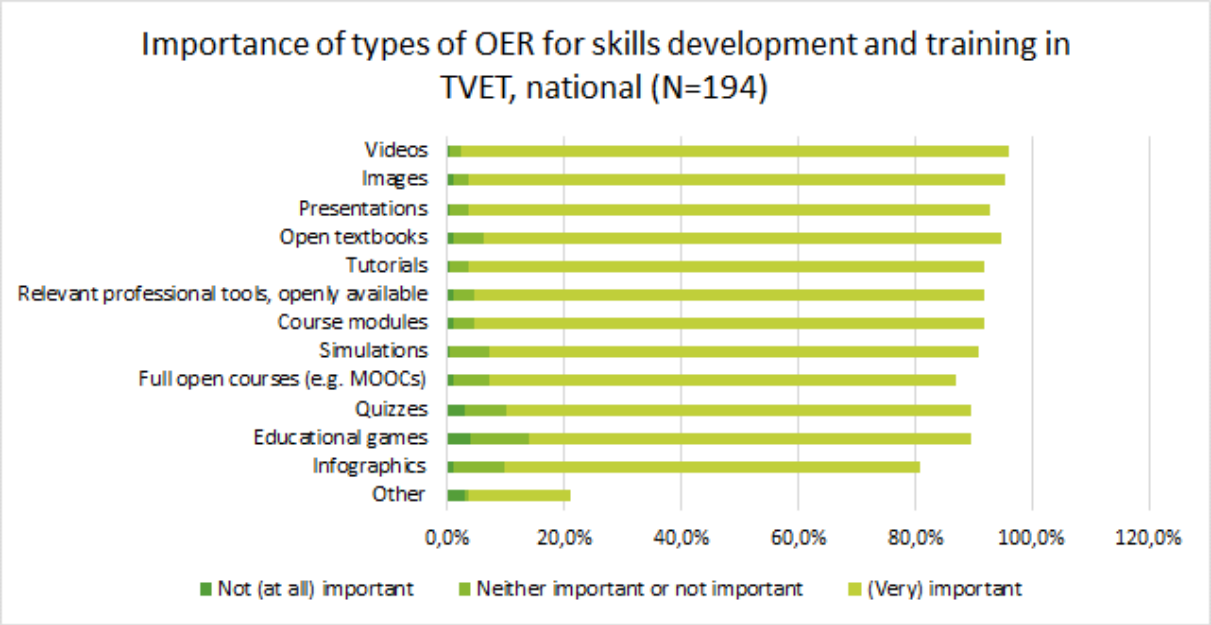
According to Gaba & Mishra (2016), besides OER, Massive Open Online Courses (MOOCs) can also play a role for enhancing skills of existing workforce and help build the capacity of young people to be prepared with appropriate skills for the job market. The literature review gave the following other references (again, for details on arguments, evidence or conclusions, the reader is referred to the relevant passages in sub-report Literature Review).
The World Bank (2015) consider MOOCs as a means to scale up access to TVET. They are seen as the needed radical new way of scaling up teaching and course upgrading of TVET. Garrido et al. (2016) have looked at the use of MOOCs in three developing countries (Colombia, the Philippines and South Africa) in order to understand the motivations of MOOC users and to detect the advantages and limitations of MOOCs for workforce development outcomes. Amongst others, the research showed that MOOCs represent a viable channel to expand training opportunities for women to gain skills and improve their competitiveness in the labor market, especially in jobs and industries where women are underrepresented. However, this potentiality is hampered by slow internet speeds and poor access when engaging with MOOCs, which even when free, can incur data and time costs.

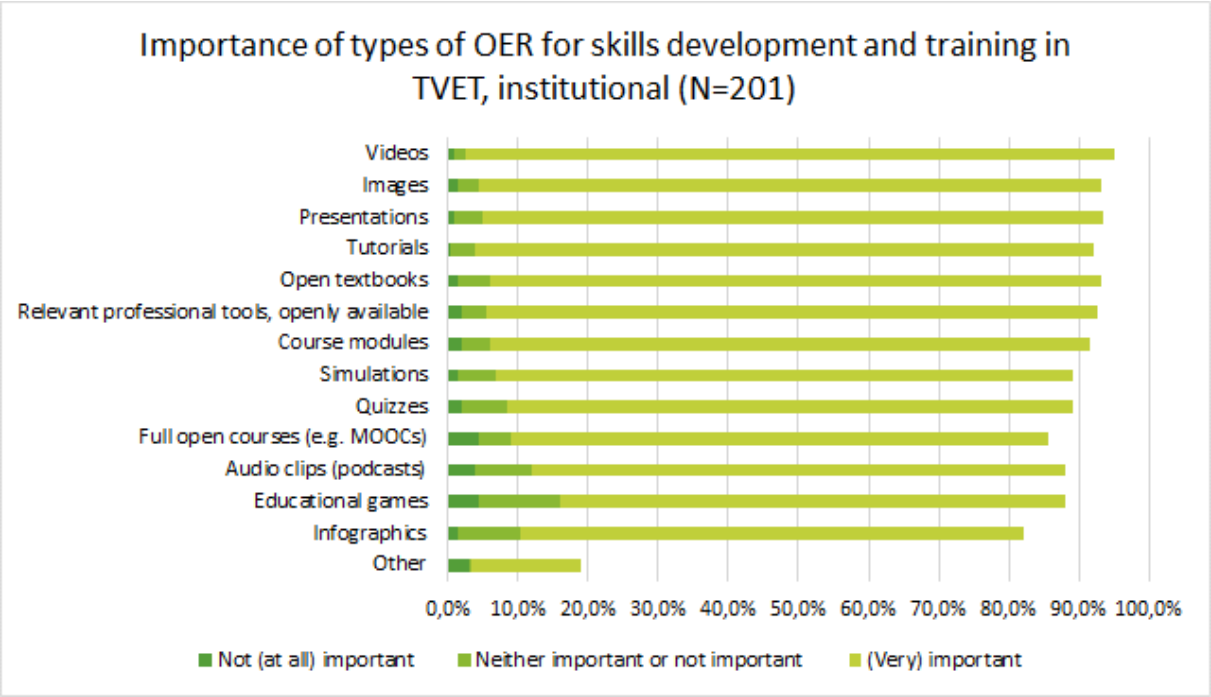
According to the OECD (2016), OER and MOOCs allow to modify learning methods and give access to quality resources to a larger population over more flexible hours. The use of digital technologies in formal education and vocational training has the potential to improve learning, although the outcomes depend on the capacity to link these tools to effective pedagogy (OECD, 2016). However, seizing the educational opportunities from digital technologies requires a process of institutional

learning, where actors are given sufficient scope to experiment with new tools and approaches and systematic assessment of outcomes leads to select the most effective practices. Barriers to access have to be addressed, as well as existing concerns about quality and status (OECD, 2016).

However, in a literature review of international peer-reviewed articles, along with related information from online publishers (such as the Australian National Center for Vocational Education Research (NCVER), The Chronicle of Higher Education and New York Times), Murphy, Williams & Lennox (2013) have argued that until then the results of studies show that in TVET, traditional face-to-face learning still seems to outperform e-learning and MOOCs (. Nevertheless, according to Murphy, Williams & Lennox the popularity and availability of MOOCs may force tertiary institutions, not only in Australis, to open rather than restrict access to their educational materials. Therefore, according to Murphy, Williams & Lennox, whether and how internationally MOOCs will evolve in the TVET sector seems a fruitful area for research. For example, how might MOOCs work for vocational education and training, globally and in the Australian context of training packages and qualification framework requirements? Furthermore, due to the need to demonstrate compliance, some courses may not be suited to MOOCs. And, rather than develop their own MOOCs, particularly due to bandwagon effects, VET providers and their staff should consider combining MOOCs with existing courses to form a blended course (Murphy, Williams & Lennox, 2013: 80).

If we look to the findings of the survey, OER to support the acquisition of 'skills for the 21st century' are considered a (very) important motive to use OER in (see graph in 2.3). Videos are considered the most as a (very) important type of OER for skills development and training in general (93% of respondents, both from a national viewpoint and from an institutional viewpoint).





About the role MOOCs can play in the uptake of OER in TVET, opinions are different. On the one hand, the opportunities MOOCs offer as a way to publish OER are recognized, although in most MOOCs the learning materials are not OER, thereby making it impossible to repurpose them (which in TVET in many cases is needed). On the other hand, only focusing on OER could be a too narrow view to get the attention needed from stakeholders. One interviewee warned for the vagueness of the term MOOC and considering MOOC as the ultimate solution for problems in TVET: “Everybody now puts a course online and calls it a MOOC. So, I was requested to do a MOOC for TVET. And I said no, I don't think that's the solution. And please come to me with problems, don't come to me with solutions. Tell me what the issue is and I'll tell you what the answer is.” Where MOOCs are used, they are from UK and US, although some efforts are mentioned about locally developed MOOCs (e.g. on agriculture).

More details

Literature review report: 25, 30, 61, 68, 70, 90, 93, 89, 91, 92, 94, 95, 99, 104

Survey report: U0, U20, U4

Interview report: R2, R5

2.5 OER for TVET and learners’ needs

In nearly all articles, reports and book chapters reviewed it is assumed - only in a few cases it is mentioned explicitly - that the learning and training needs of the learners must be starting point for the production and/or use of OER for TVET. One of the benefits ascribed to OER is that OER will make it easier to adapt teaching and learning to learners’ needs. In none of the publications reviewed, however, evidence was presented.

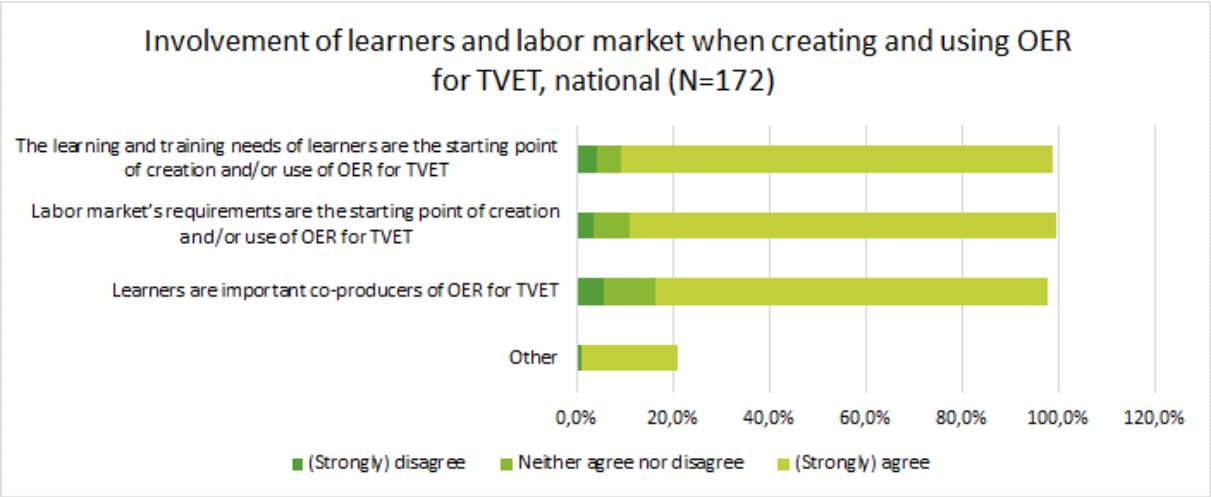
In a study of TVET in the Commonwealth Pacific Countries, Neal (2011) asserts that open and flexible TVET meets better the needs of learners and employers about when, where and how to learn. She also points at the advantage that open and flexible TVET increases access for those limited by geography or multiple demands on their time, and decreases dependence on tools and equipment through use of video demonstrations and simulations.

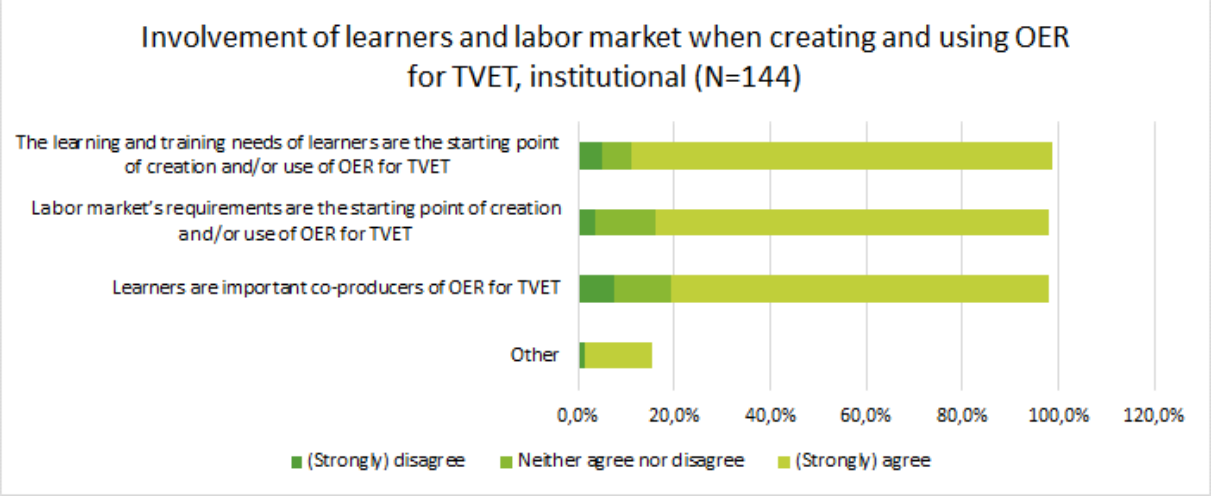
In a report by the Commonwealth of Learning on Malaysia (Commonwealth of Learning, 2017a), it is stated that releasing publicly funded teaching and learning materials under an open license (preferably the most current version of Creative Commons attribution licenses) will bring the following advantages to learners in Malaysia:

- Increased equal access to quality learning resources;
- Enhanced free and open access to knowledge which can be reused and repurposed in different forms;
- Stronger ICT-enabled learning as well as open learning through better engagement;
- Facilitation of inclusive education for learners with varying abilities (Commonwealth of Learning, 2017a).

In the literature reviewed, we have come across one study in which TVET learners are treated as co-producers (Isaacs, 2017). She refers to two case-studies within the INVEST Africa program. Although they are, according to Isaacs, isolated cases, they nevertheless reflect a shift in attitudes and practices. In the two programs teachers have learned to apply learner-centered approaches thereby developing and using OER, while at the same time learners were encouraged to co-produce videos as a means of learning, to use OER and to learn independently and collaboratively (Isaacs, 2017:150).

This finding that there is only one study on students as co-producers contrasts strongly the findings in the survey. In the survey, 81% of the respondents from a national viewpoint and 79% of respondents from an institutional viewpoint (strongly) agreed with the statement that learners are important co-producers of OER for TVET. 90% of the respondents from a national viewpoint and 88% of respondents from an institutional viewpoint (strongly) agreed with the statement that the learning and training needs of learners are the starting point of creation and/or use of OER for TVET. A possible explanation for this contrast is that respondents in the survey have interpreted the questions as desirable instead of interpreting them as actual practices.





More details

Literature review report: 25, 55, 58, 81

Survey report: U6

Interview report: R4

2.6 OER for TVET, market needs and involvement of the private sector

There is a great need for TVET to respond adequately to the challenges of knowledge economies. One of the ways to do this is that private sector and industries engage in the production of resources for skills development and in the actual skills development itself (World Bank, 2015). In UNESCO policy documents, involvement of the private sector is advocated (UNESCO, 2015b; UNESCO, 2016b). In a report on inclusive growth and sustainable development, Gaba & Mishra (2016), however, have observed that Asian Commonwealth countries still have a common challenge about the mismatch between industry needs and the skills training that these countries are trying to address.

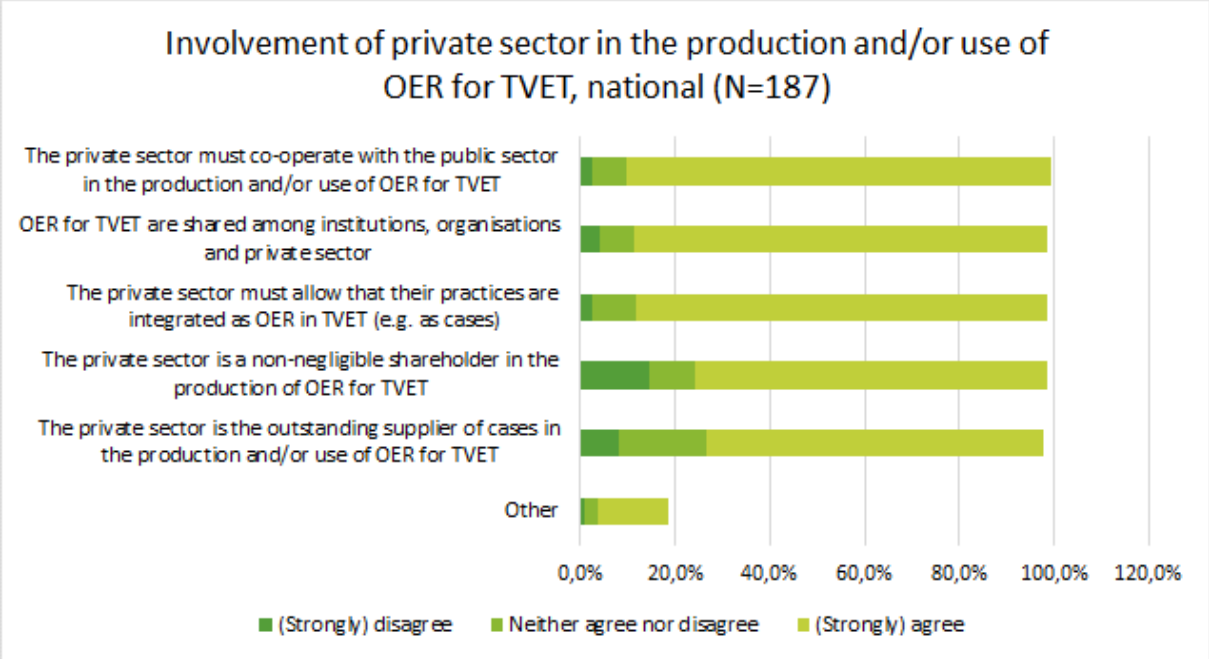
This applies even more for the development of learning resources for TVET. In the literature reviewed, however, we have the following examples of involvement of private sector in the production of OER. In their case study of the Open Polytechnic of New Zealand, Seelig & Nichols (2017) indicate that industry is involved in the development of most courses and programs of the

Open Polytechnic. The Open Polytechnic was forced to rethink its strategy because over the years the numbers of students were steadily decreasing. The students are predominantly independent adult learners combining work and study. The Open Polytechnic changed its online learning system, focused on online engagement and changed its technical and vocational education and training from resource based to learner-centric and collaborative learning. Its offerings and development have been modelled on the English polytechnic system, with an emphasis on flexibility of approach, work-based learning and engagement of and partnering with business and industry. There was no mention of the particular licenses used for the courses and programs developed at the Open Polytechnic.

An argument often heard in favor of OER is that OER are more flexible and responsive to changes in market demands, i.e. easier to change and update. Several participants in the virtual conference confirmed this. On the other hand, using OER often involves contextualization of OER to meet specific needs, which implies costs. Often available textbooks and other learning materials have been developed for use in other countries. (Neal, 2011: 4).

In the survey, 89% of the respondents from a national viewpoint and 82% of respondents from an institutional viewpoint (strongly) agreed with the statement that labor market's requirements must be the starting point of creation and/or use of OER for TVET. See the graphs in 2.5. This was confirmed by some interviewees.

Both in the survey, the interviews and in the virtual conference, involvement of private sector is mentioned as desirable (90% of respondents in the survey). The respondents in the survey regarded their most important role as supplier of cases in the production and/or use of OER for TVET (87%).



There are some barriers mentioned though. Some interviewees experienced an unwillingness to contribute to OER development because of financial reasons (opportunity to sell the learning resources). It was also pointed out that in some cases (mostly in the area of ICT) proprietary learning materials are used which cannot be published as OER. An interviewee pointed out that making an

appeal to the social responsibility of a company is an insufficient and therefore unsuccessful argument.

More details

Literature review report: 47, 87, 89, 90, 92, 98

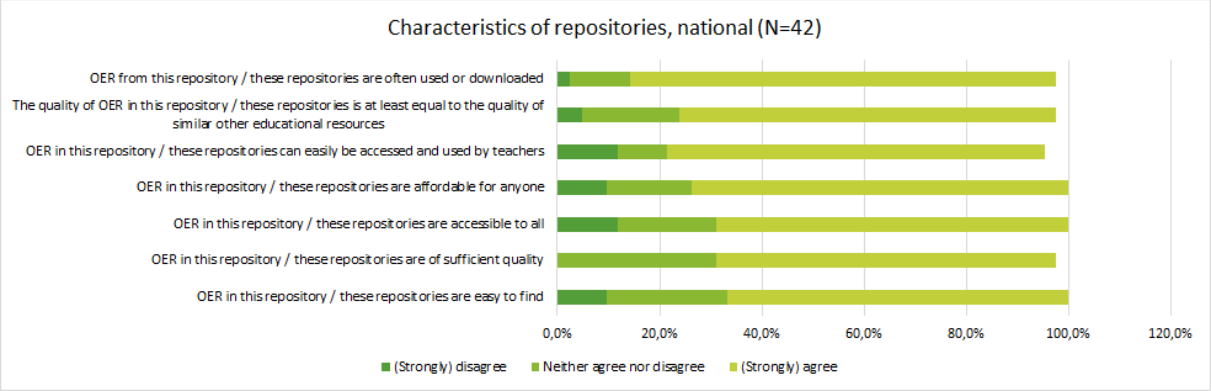
Survey report: U6, U7

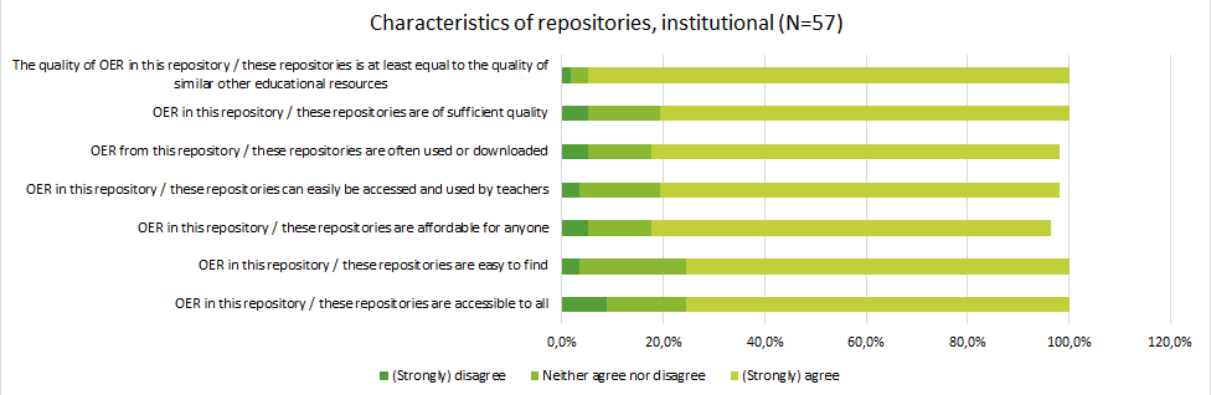
Interview report: R7

2.7 National and institutional OER repositories for TVET

In the literature review three OER repositories have been referred to. First there is OAsis, the Commonwealth of Learning's online institutional repository for learning resources and publications (INVEST Africa, TESSA, VUSSC, OER Africa). The resources and publications found here are licensed under Creative Commons BY-SA 4.0 and can be freely downloaded for reuse and adaptation with attribution to COL (exceptions are noted). The other two occasions were about advocacy for establishing (OER) repositories in Bangladesh (Salam & Azad, 2017) and Thailand (TVET Academy) (Mabille, 2017; OECD-UNESCO, 2016). A closer inspection of the latter has shown that it is not really an OER repository.

In the survey, 29% of the 170 respondents mentioned the existence of a national repository on OER for TVET and 38% mentioned an institutional repository. From those respondents, 67-84% of respondents from a national viewpoint and 75-95% from an institutional viewpoint are positive about use, accessibility and quality of the repositories, although agreement about the quality of the OER in institutional repositories was higher (95%) than in national repositories (74%).





Many references to repositories are provided in the survey and in the interviews. The following table gives an overview of the repositories mentioned in the survey and the interviews, and suggested by third parties, for instance during the 2nd OER World Congress or the UNESCO-UNEVOC virtual conference.

In the overview of the repositories, the following describing elements are used:

- Setup: institution or department who have set up and maintain the site
- TVET: Fraction of the site dedicated to TVET.
- Support tools: availability of tools (like templates for policy documents) for creation or using OER

All sites in the next table also contain general information: policy documents, information about non-free courses and programs, projects, referrals to other useful sites et cetera. Resources are in English, Spanish, Basque or Chinese.

URL	**Setup**	**TVET**	**Support Tools**
http://ldt.eworks.edu.au/Resources.aspx	Australian government	Included	Yes
https://bccampus.ca/open-education/	BCCampus, Canada	Small %	Yes
http://www.tvet.org.cn/html/index.html	Chinese Vocational Education Resources Information Network	100%	Yes
http://usp.ac.fj.libguides.com/freeresources	University of South Pacific	Included	Yes
http://ocw.lms.athabascau.ca/	Athabasca University	Small %	?
https://textbooks.opensuny.org/open-source-textbooks/	State University New York	Small %	No
https://www.tknika.eus/en/materials/	Tknika (Spain/Basque)	100%	No
http://www.gastronomiavasca.net/en/gastro	Leioa School of Catering (Spain/Basque)	100%	No
https://procomun.educalab.es/	Ministry of Education, Spain	Included	No
http://nptel.ac.in/	MHRD, Govt. of India	Included	Yes
http://doer.col.org/	COL	Included	No
http://oasis.col.org/	COL	Included	No
https://phet.colorado.edu/	University of Colorado	Included	Yes
http://www.mcast.edu.mt/	Malta College for Science, Art & Technology	100%	Yes
https://www.skillscommons.org/ (see also section 2.8)	U.S. Department of Labor's Trade Adjustment Assistance Community College and Career Training (TAACCCT)	Included	Yes

The values in the column TVET have the meaning:

- Included: resources for TVET are included, next to resources for other education sectors
- Small %: same as included, but only a small fraction of the total number of resources are for TVET
- 100%: only resources for TVET are available

An analysis of the repositories in the table has shown that only a small number of these repositories are aimed at OER for TVET. In the survey and in the interviews it has been stated that many consider generic platforms like WikiHow and Youtube to be important repositories for TVET too, although many materials in these repositories cannot be considered to be OER in the sense as we have defined in chapter 1.3. As one interviewee formulated it: "Youtube is the largest trainer in the world without a single person as a trainer". From the survey, it has become apparent that the free accessibility of resources is valued more than the rights to repurpose them. This holds especially from a learners' perspective. For learners free access is a very, if not, the most important use aspect. From a teachers' perspective, however, the rights to re-use, adapt, or to localize, to the needs of specific situations are considered to be important. In order for this localization, the 5 R's, are necessary. In the virtual conference this finding was confirmed

More details

Literature review report: 18, 31, 38, 77, 83, 85

Survey report: S3, S3b, S3c

Interview report: R4, R8

2.8 Interesting TVET - OER projects

From the literature reviewed the projects or programs of INVEST Africa and the Virtual University of the Smaller States of the Commonwealth (VUSSC) come to the fore as lasting and comprehensive international projects in the field of OER for TVET. An important actor in both projects is the Commonwealth of Learning. The projects OER Africa and TESSA are also worth mentioning.. In these latter programs the Open University (UK) was the leading partner. We will focus here on INVEST Africa and VUSSC for the following reasons. These projects have existed for some time. OER uptake is seen as part of a broader (change) process, with regard to capacity building, national and international collaboration between various stakeholders, accreditation and recognition, bridging formal, non-formal and informal learning, introduction of innovative ways of learning and teaching, and building the necessary ICT-infrastructures.

INVEST Africa

INVEST Africa[19] is aimed at capacity building on the premise that flexible and blended learning and teaching approaches can impact positively on the goals of TVET institutions to expand access to quality vocational education and skills development, especially for informal sector skills training; and that it can support the inclusion of girls and women and promote gender equity. In 2010, there were 13 partner institutions involved from seven countries - Ghana, Kenya, Mozambique, Nigeria, Tanzania, Uganda and Zambia - all belonging to the Commonwealth Association for Polytechnics in Africa (CAPA). By 2015 INVEST Africa had scaled up to 93 partner institutions in these seven African countries.

In the INVEST Africa program TVET is seen as one of the key areas of attention. Technology-enhanced, flexible and blended approaches to TVET can contribute to improvements in access,

[19] https://www.col.org/programmes/technical-and-vocational-skills-development/invest-africa

gender, quality and efficiency indicators. Experience of using these approaches is not widespread in institutions and ministries in Commonwealth countries. The core challenges that the TVET program addresses are inadequate quality in, and low access to TVET, especially for women. In developing countries most of the young people are not in education, employment or training. This has put great pressure on providers of TVET to expand their enrolments.

In the INVEST Africa concept of ICT-based teaching and learning the development and use of OER play an important role in opening up the systems of teaching and learning. The dominance of traditional ways of teaching and the slow adoption of ICT-based teaching and learning were seen to be among the critical challenges in transforming African TVET. Therefore, the aims of INVEST Africa are to develop capacity in the use of educational media and technology (including OER) in CAPA member institutions in order to:

- Improve the quality of TVET offerings, amongst others by involving educators in the production and use of OER, and by producing OER;
- Address the unequal training opportunities fostered by inequities based on geographical location, gender and socio-economic factors, amongst others by use of open distance learning in which OER play an important role;.
- Expand access to TVET to the informal sector of the economy by developing OER for self-learners in the informal sector (for instance courses and OER in manicure & pedicure, brick making, poultry farming, biogas development);
- Help the huge numbers of poorly educated, frustrated and unemployed youth who are "locked out" of the formal skills training systems, by giving them free access to learning materials and courses (OER).

By the end of 2015 all 13 institutions involved had adapted flexible ICT-based learning approaches, more than 350 teachers had been trained in integrating new educational media in their teaching an training, in the production and use of OER, groups had been working on strengthening women's participation in TVET, and over 3,000 learners had enrolled in new courses for non-formal learners (Mead Richardson, 2015)

Virtual University for Small States of the Commonwealth

The Virtual University for Small States of the Commonwealth (VUSSC)[20] is another example of an international collaborative project or program in which OER are a pivotal value offering and building block. The VUSSC was established in 2000 as a network university through which small countries committed themselves to the collaborative development, adaptation and sharing free content (OER) for use in educational contexts. The VUSSC itself is not an educational institution. Rather, it is a mechanism for small countries to collaboratively develop, adapt and share courses and learning materials. It is also a forum for institutions to build capacity and expertise in online collaboration, eLearning and information and communication technologies (ICT) in general.

Current content covers fields such as agriculture, life skills, disaster management, fisheries, port management, online content development and professional development for educators. In the

[20] https://www.col.org/programmes/vussc/virtual-university-small-states-commonwealth-vussc

development of high quality OER, VUSSC works closely with professionals and specialists in industry to ensure that the materials are relevant. The materials are learner and teacher oriented and developed bearing in mind the language skills of the target audience. In keeping with the ideals of OER the materials are adaptable and in digital format for portability. Capacity development is also an important task of VUSSC It is aimed at increasing the number of persons involved in developing OER thereby sustaining their development.

To date, 32 small countries have committed to the VUSSC. Participating countries focus on the collaborative development of post-secondary, skills-related courses in areas such as tourism, entrepreneurship, disaster management, life skills, use of information and communication technologies, and small fisheries management. The materials produced by the VUSSC countries are non-proprietary and are readily adaptable for use in specific country contexts.

The small states (usually defined as having populations of fewer than 1.5 million) make up two-thirds of the 53 countries in membership of the Commonwealth. Each of the countries usually has one national university. The intention of VUSSC is to stimulate an increase in the course offerings in these smaller countries and to create a mechanism to enable the transfer of credits and qualified people across borders of countries. The VUSSC is using the Transnational Qualifications Framework (TQF) for International Accreditation for the Virtual University for the Small States of the Commonwealth. The aim of a TQF is to ensure that all the open educational resources that are being created collaboratively can be adapted into recognized courses that students can take for credit through the recognized institutions of the small states.

In the projects referred to above, the adoption of OER is part of broader programs of innovating TVET (e.g. the implementation of flexible and blended learning programs). Adoption of OER in TVET at institutional level requires changes, not only in the ways of teaching and learning. It also requires institutional policy and capacity planning, most likely also the adaption of organizational structures, innovative staff and teacher development, ICT skills development, and instructional design capacity development (flexible and blended model of TVET, and OER for TVET) , and last but not least adequate (ICT) infrastructures.

The Commonwealth of Learning (COL) is an active partner in both projects and programs and as such an important actor the field of OER in TVET. COL mainly provides services in Commonwealth countries in the Global South, although occasionally other countries outside of the Commonwealth are also served. Their vision is to create awareness and organize capacity building workshops with a train the trainer approach to ultimately provide teachers and trainers with the necessary skills for finding and repurposing OER. COL also perform activities in policy development, both from national viewpoint and COL also from institutional viewpoint.

Skillscommons.org

During the 2nd OER World Congress and the virtual conference our attention was drawn to the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program of the American federal government and more specifically to the repository SkillsCommons.org initiated in

the program[21]. This program and repository hadn't come forward in the literature review nor in the survey or interviews.

The TAACCCT program is meant to increase the ability of US community colleges to address the challenges of today's workforce. Grants are provided to assist workers adversely affected by trade agreements in industry sectors facing problems as well as a broad range of other adults. Every U.S. state received funding during 2011 – 2014 through 256 grants totaling $1.9 billion. TAACCCT grants, which continue through September 2018, are impacting 60% of the nation's publicly-funded community colleges and building industry-aligned programs in manufacturing, healthcare, information technology, energy, transportation and other industries[22].

There are four strategic priorities for the TAACCCT program: 1) accelerate progress for low skilled and other workers, 2) improve retention and achievement rates to reduce time to completion, 3) build programs that meet industry needs including development of career pathways, and 4) strengthen online and technology enabled learning.

Under the TAACCT program the free and open online library SkillsCommons.org was developed. This repository contains free and open learning materials and program support materials for job-driven workforce development, developed by the colleges and other educational institutions. SkillsCommons.org is designed and managed by the California State University and its Merlot program[23]. At the end of September 2017 the total number of hits was 897,343 of which 630,861 were file downloads[24].

Many colleges or consortia of colleges developed programs of study aligned with local and regional business needs, which were identified through partnerships formed or strengthened with grant funds. To help adult students obtain industry-recognized credentials more quickly, colleges were using TAACCCT funding to innovate with strategies such as career pathways, credit for prior learning, competency-based models, online training, and strong student support systems. The TAACCCT program provided eligible institutions of higher education with funds to expand and improve their ability to deliver education and career training programs that can be completed in two years or less, and that result in skills, degrees, and credentials that prepare program participants for employment in high-wage, high-skill occupations, and are suited for workers who are eligible for training under the TAA for Workers program. The following provision to the TAACCCT program was made in 2011 by the US Congress: none of the funds made available may be used to develop new courses, modules, learning materials, or projects in carrying out education or career job training grant programs unless the Secretary of Labor certifies, after a comprehensive market-based analysis, that such courses, modules, learning materials, or projects are not otherwise available for purchase or licensing in the marketplace or under development for students who require them to participate in such education or career job training grant programs[25]. An overall evaluation of the TAACCCT is not available yet[26].

[21] https://doleta.gov/taaccct/
[22] https://www.urban.org/research/publication/taaccct-goals-design-and-evaluation
[23] https://www.merlot.org/merlot/index.htm
[24] https://www.skillscommons.org/#stats-module
[25] https://appropriations.house.gov/uploadedfiles/fy_2012_final_lhhse.pdf, SEC 124.

OER for TVET in the Caribbean

During the virtual conference attention was also paid to TVET projects in the Caribbean where OER for TVET are and will be produced.

In 2001, an ICT-based TVET program was started in the Caribbean, as a consequence of concerns about the low status of TVET in the region and recognition of the need to improve the pedagogical skills of TVET teachers and provide them with a recognized base qualification. The project was initiated by the Commonwealth of Learning (COL) for teachers in vocational schools and colleges lacking any formal qualifications. A 12-module curriculum included general subjects such as educational theory and practice, language and communication and educational technology as well as TVET-specific modules such as administration and management of TVET, workshop organization and management and safety. Delivery to the learners in the Bahamas, St. Kitts and Nevis and Grenada was by means of CD-ROM, email, telephone and in-country face-to-face tutorials. Fifty TVET teachers graduated from this initial program. The course materials are available as OER in COL's open educational resources repository (Commonwealth of Learning, 2015).

Another TVET project in the Caribbean concerned the **Caribbean Vocational Qualification** (CVQ) assessor training. The aim of the project was to develop OER for CVQ assessor training using a collaborative approach. In the Caribbean region a single market and economy (Caribbean Single Market and Economy) was formed in response to the challenges and opportunities presented by the global economy. One of the changes brought about by this single market was the introduction of a CARICOM (CARIbbean COMmunity) Certificate of Recognition of Skills Qualifications which allows people who possess a CVQ to move and work freely within the region. One of the consequences of this introduction was the implementation of the CVQ in all institutions and the development of training programs for TVET instructors and assessors according to approved competency standards. For this, OER for assessor training were developed involving collaboration among Caribbean National Training Authorities (NTAs) from Barbados, Grenada and Trinidad & Tobago with Commonwealth of Learning (COL). The project ran until June 2017 (Mead Richardson & Whiteman, 2017).

OERUP!

One of the interviewees mentioned the OERUP!-initiative. From their website[27]: "The EU project OERup! was launched in September 2014. In the spirit of openness and sharing, its aim was to help adult education institutions successfully implement OER (Open Educational Resources) and OEPs (Open Educational Practices) in adult education in Europe in order to widen participation in Open Education. Within two years, five established European partners created and tested a training, following a preliminary need analysis in their regions. The OERup! project addresses with its activities primarily decision makers and educational professionals of adult education as well as relevant policy makers. This online platform and a google+ community was established to share OEP experiences and to provide all practitioners with the training package and a guideline, as well as with a quality framework and the status quo analysis of European regions which was being developed throughout the project lifetime."

[26] https://www.taaccteval.org/about-the-national-evaluation/
[27] https://www.oerup.eu/about/

A closer investigation revealed that the project contains 13 good practices with OER for adult education purposes (several of them in German and Spanish). Clicking through them reveals that several of them give 404 errors or aren't about OER (e.g. a policy document for Open Access).

More details

Literature review report: 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 68, 72

Survey report: -

Interview report: R4

3 Open Educational Resources Policies for TVET: approaches and instruments

3.1 Introduction

In this chapter, the findings from the literature review, the survey and the interviews with regard to policy are presented. We have classified the information obtained into the following topics:

- Identification of policy approaches
- Identification of policy instruments
- Impact of policy approaches and instruments

The same disclaimer as was formulated in section 2.1 also holds for this chapter: both in the literature review as in the survey it often remained unclear whether the finding or statement referred to a realized outcome or effect (**evidence**) or to an expected outcome or effect (**expectation**) of OER. Where we have been able to determine what is the case (evidence or expectation) this is mentioned. Also, the focus of this study was on the use and effects of OER in TVET. In TVET programs and project certain goals, for which OER are used, may also be achieved with instruments other than OER. Determining the relative contribution of OER compared to other instruments has not been a subject of this study.

3.2 Policy approaches identified

Much of the literature reviewed is about projects and programs. From the literature which deals with policy with regard to OER for TVET – predominantly publications by UNESCO and COL - it can be seen that in various countries national policies for OER have been formulated and finalized (Bahrain, Kenya, Madagascar, Oman, Philippines, Qatar, Saudi Arabia and very recently Nigeria) or are under way (Djibouti, Ethiopia, Ghana, and Indonesia (UNESCO, 2017)). In the literature, we have found that the Pacific Commonwealth countries Fiji, Kiribati, Nauru, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu have identified TVET as an important part of their national education strategies (Neal, 2011). Other countries like India, Sri Lanka, Thailand, Togo, Madagascar and Namibia are in the process of developing comprehensive national policies with regard to TVET (World Bank, 2015; OECD, 2016; Jayalath, 2017). In all these established and developing national policies there is not yet much attention for the potential of OER for TVET. As already mentioned in the previous chapter, in the 2nd OER World Congress and the virtual conference our attention was drawn to the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program of the American federal government. This can be seen as federal policy with regard to OER for TVET, be it only for of US community colleges.

In reports from international organizations and policy advisors the potentially crucial role of OER and open MOOCs is much more emphasized. MOOCs are mentioned more often (World Bank, 2015; Gaba & Mishra, 2016; Latchem, 2017c). Authors like Latchem (2017a) and Herd & Mead Richardson (2012) regard OER are as an important educational movement that can have great impact on TVET. Particular importance is ascribed to the role of teachers. “OERs can greatly facilitate teachers’ development of new flexible learning approaches in skills education and training. TVET teachers embarking on more flexible delivery approaches can access existing content and contextualize it to their own curriculum, thus speeding up the process of materials development. Where teachers lack

technical expertise in specific aspects of a vocational subject, expert materials can help to bridge the gap." (Herd & Mead Richardson, 2012:16). OER accessible online are regarded to be very useful for educational centers, enabling them to access additional expertise, although a great challenge lies in identifying suitable OERs and adapting them to suit local needs and curricula. An example of this approach is INVEST Africa, wherein OER are named as key technology for educating and training teachers, for enabling them to access relevant materials and expertise and enabling them to exchange materials (Isaacs, 2017; see also UNESCO-UNEVOC,2013)

In a OECD-UNESCO Report on Education in Thailand (OECD-UNESCO, 2016) it is maintained that "OERs are particularly important in developing countries where students may not be able to afford textbooks, access to classrooms may be limited, and professional learning programs for teachers may be lacking. In industrialized countries, OERs can also offer significant cost savings (….) Countries should not rely solely on internationally developed OERs but should invest in developing their own digital learning resources. These can be created by the public sector or procured, directly or indirectly (e.g. by having students' families purchase them) from educational publishers. In either case, governments should design a clear and consistent policy setting out the processes they will follow to make the digital learning resources available. In addition to governments, the private sector, bottom-up entities such as nongovernmental organisations (NGOs), or users themselves may establish initiatives to develop digital learning resources. The changing education landscape makes new scenarios for the production of these resources possible. Involving teachers in their production can be a particularly effective way to reduce costs and improve teachers' digital competency" (OECD-UNESCO, 2016: 264 - 265).

What we see here and this is what can be seen in other countries where OER policies have been developed, is that OER policies are integrated into overall education policies and contribute to achieving established education goals, rather than working in isolation (see e.g. the overview of policies in (Commonwealth of Learning, 2017b), p 16-18). In fact, UNESCO sees the national strategy for OER developed by Bahrain as an example of how a comprehensive national OER policy can be developed. The OER policy and master plan encompasses raising awareness of all stakeholders, capacity building for teachers and developers and managers of OER, as well as upgrading of infrastructure, quality assurance mechanisms, implementation strategies, and monitoring and evaluation methods (UNESCO, 2015b). Nevertheless, some authors have pointed out that whilst there are many examples of national OER policies developed or under way, there is not much happening yet in terms of broad adoption of OER in TVET (Latchem, 2017a, 2017d and 2017e; Marope, Chakroun & Holmes, 2015).

For policies to be effective, motives to create and use OER should be the driver for policies, both from national and from institutional viewpoint. From national viewpoint, helping to achieve 'non-discriminatory' access to high-quality educational resources and continually improve the quality of educational resources for TVET (both 94% of respondents), reducing the barriers to learning opportunities in TVET and support the acquisition of 'skills for the 21st century' (both 93% of respondents) are mentioned the most in the survey. From institutional viewpoint, to get new ideas and inspiration and improving the quality of learning materials (both 96% of respondents) are mentioned as the most important motives. See the graphs in 2.3. However, no evidence is available if these motives are actually inspiring the policies on OER.

More details

Literature review report: 11, 14, 15, 16, 17, 18, 20, 28, 51, 75, 77, 79, 82, 83, 85, 93, 98

Survey report: U4, U5

Interview report: -

3.3 Policy instruments identified

In the literature and interviews, the following policy instruments have been mentioned more than once (see amongst others Marope, Chakroun & Holmes, 2015; UNESCO, 2015b; UNESCO-New Delhi Office, 2015; Isaacs, 2017); Salam & Azad, 2017; Abeywardena, Dhnarajan & Lim, 2013; OECD-UNESCO, 2016; UNESCO-UNEVOC, 2013):

Governance

- Foster awareness amongst all stakeholders regarding the value of OER in teaching, learning and skills development;
- Reinforce development of national and institutional policies on OER with special attention for OER for TVET;
- Promote the understanding of and encouraging the use of open licensing of educational materials;
- Foster strategic alliances, such as public-private partnerships, to make OER initiatives scalable and meaningful;
- Monitor and evaluate the adoption of OER, and encourage research on OER for TVET.

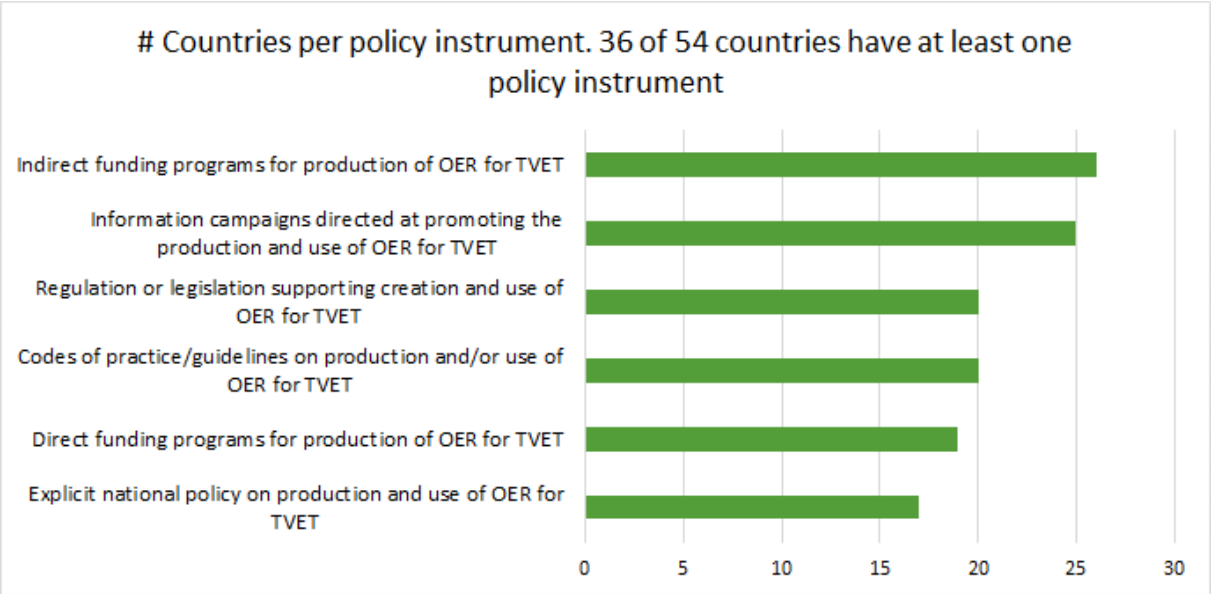
Capacity building

- Support capacity building for trainers, teachers and developers and managers of OER in general and of OER for TVET in particular;
- Build OER repositories and mechanisms to maintain quality, and facilitating finding, retrieving, repurposing and sharing of OER;
- Encourage the development and adaptation of OER for TVET in respective (local) languages and cultural contexts;

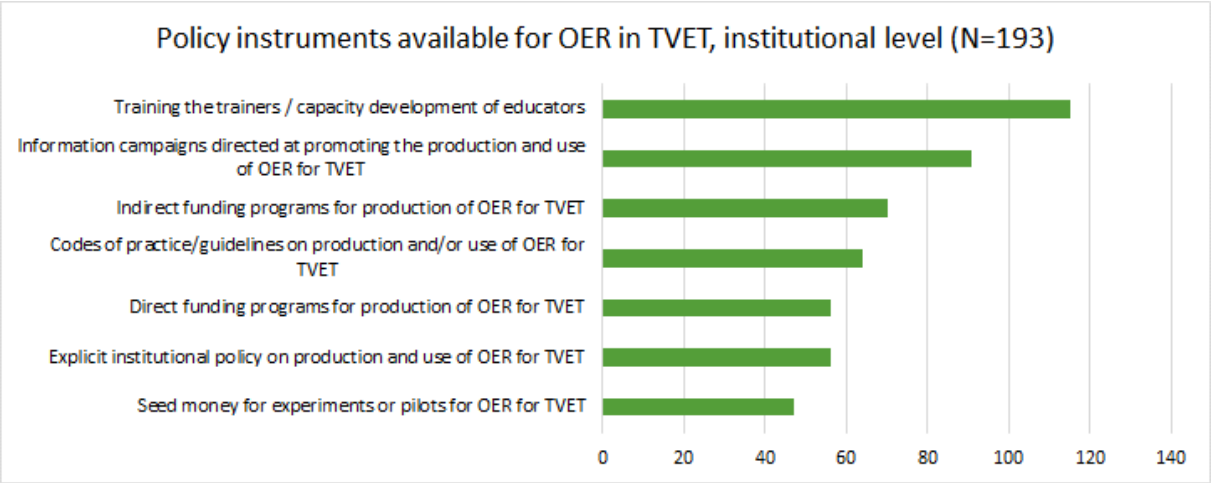
Quality

- Recognition of the (potential) role of OER in the quality improvement processes in educational institutions.

In the survey, respondents of 36 of 54 countries represented in the survey mentioned availability of at least one policy instrument. Most mentioned instruments are indirect funding programs for production of OER for TVET (in 26 countries) and information campaigns directed at promoting the production and use of OER for TVET (in 25 countries).



From institutional viewpoint, programs to train the trainers / capacity development of educators is mentioned the most (60% of the 193 respondents).



Incorporating OER in learning and teaching processes is often done as part of a broader program on incorporating ICT in learning and teaching processes.

More details

Literature review report: 9, 17, 18, 23, 77, 78, 80, 83, 85

Survey report: S1, S2, S4

Interview report: R4

3.4 Impact of policy approaches and instruments

In the literature reviewed no systematic evidence of the impact of OER and/or MOOCs for TVET, nor systematic evidence of the impact of policies with regard to OER and/or MOOCs for TVET have been found. In a few studies data concerning effects of OER have been presented. These studies are either studies in which projects or programs are described and - not always - evaluated, in which OER or

open MOOCs have been one of the instruments used (Isaacs, 2015, Isaacs, 2017; Mead Richardson, 2015; Adala, 2016), or studies that indicate that OER probably have contributed to the achievement of objectives of the project or program (Neal, 2011; Mead Richardson, 2009; Konayuma, 2013; Modesto, 2016; Mabile, 2017).

In the survey, 25% of the respondents mentioned awareness of impact of policy approaches and instruments from national viewpoint, against 32% mentioning awareness from institutional viewpoint. Asked for more details on impact, about 15 references to policy instruments are provided.

In interviews, more details are provided on impact. Asked on an opinion about the Qingdao Declaration (on performing activities to widen OER use), there was doubt whether governments are actually performing activities to make the statement a living one. Disagreement was also formulated about time scale and immediate priorities, where the potential contribution of OER to increase accessibility and affordability was not recognized by some respondents (both from a national and institutional perspective) with statements like “let's talk about real problems at universities, not this stuff”. Priority is to achieve more political attention and resources for TVET and to find more effective ways of (massive) learning and education (e.g. blended learning and distance education).

All interviewees endorsed the statement that the far reaching changes that can result from the incorporation of OER in TVET teaching and learning have yet to be matched by the reality. Lack of infrastructure, integration and coordination, need to upgrade the mindset and skills of teachers and to update country policies are mentioned as the causes respectively the main activities to come out of this situation. Also, more empirical research is needed to gain more insight into the actual impact in TVET.

More details

Literature review report: 67, 74

Survey report: S5

Interview report: R1, R11

4 Challenges for Open Educational Resources for TVET

4.1 Introduction

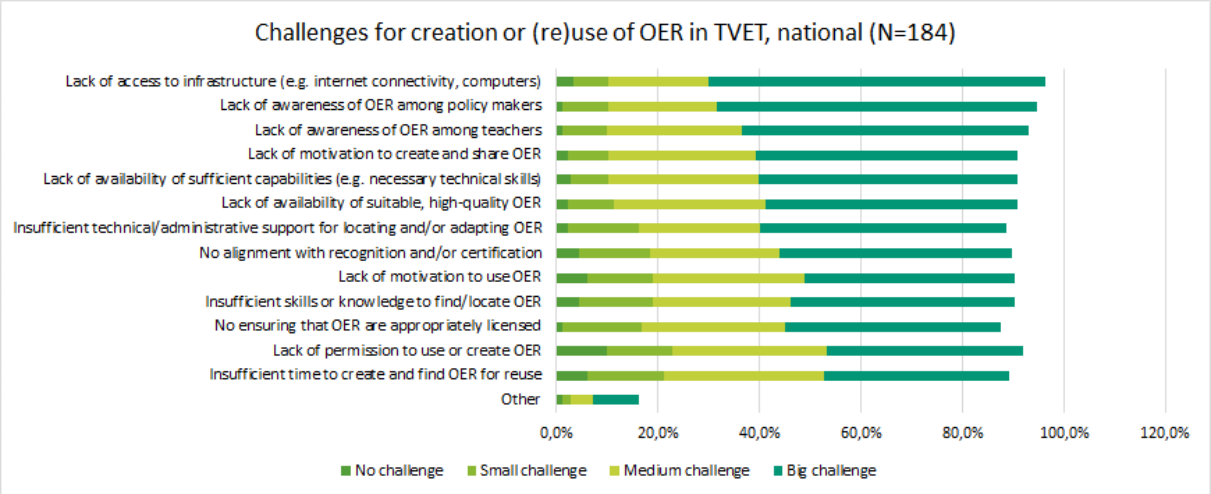
Challenges and barriers to create and use OER in TVET are manifold. The barriers and challenges are in some cases specific for TVET, as a consequence of the characteristics of TVET. Other barriers and challenges are not specific to TVET, and occur also in other educational sectors. In this chapter, the barriers are listed against motives to create and use OER in TVET.

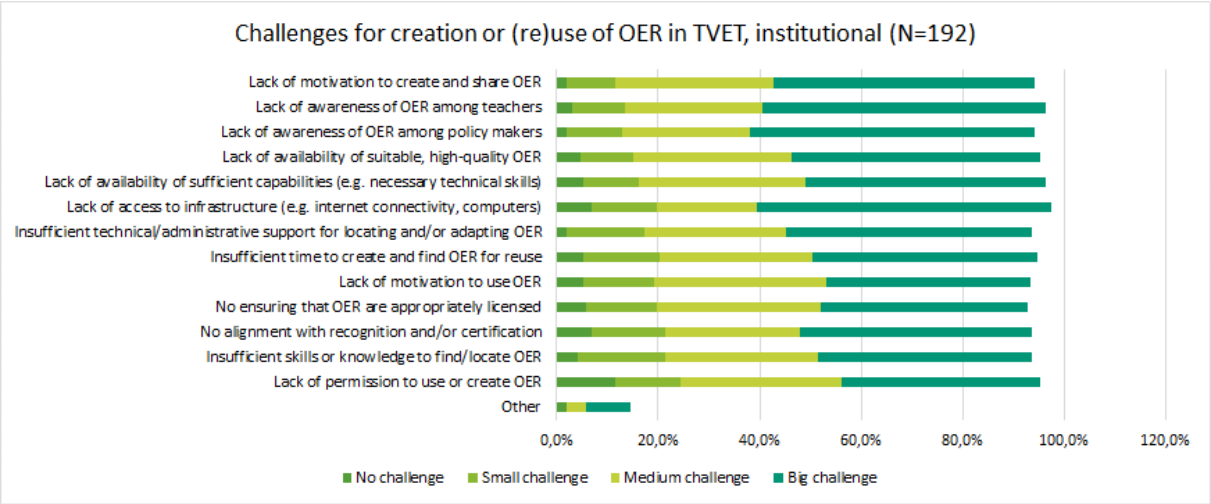
We have classified the information obtained into the following topics:

- Aligning OER to the key challenges for TVET
- OER and equal access to TVET
- OER and cost reduction and affordability of TVET
- OER and quality improvement of TVET
- Teachers, trainers and OER for TVET
- Learners and OER for TVET
- OER and skills development and training in TVET
- OER and bridging formal, non-formal and informal TVET
- Validation of learning outcomes and certification
- Involvement of public and private sector

The following subchapters refer to survey question U3 where opinions on challenges were collected. Again, bear in mind the disclaimer as formulated in sections 2.1 and 3.1

The following two figures give an overview of the results of this survey question.





From a national viewpoint, lack of access to infrastructure (86% of respondents) and lack of awareness of OER among policy makers (84% of respondents) are considered the most a medium or big challenge. From an institutional viewpoint, lack of motivation to create and share OER and lack of awareness of OER among teachers (both 83% of respondents) are considered the most as a medium or big challenge.

4.2 Aligning OER to the key challenges for TVET

TVET covers a wide range of education and training, and various concepts or approaches to TVET are employed around the world, with different roles and concepts in each country, sometimes even within countries. Characteristics of TVET influencing the uptake of OER are (World Bank, 2015; CEDEFOP, European Commission & ICF, 2016; Technopolis, 2016; Nayana Tara & Sana Kumar, 2016; Gaba & Mishra, 2016: Adala, 2016; Isaacs, 2017; Latchem 2017a, 2017d, 2017e):

- TVET ranges from young people gaining knowledge and skills from basic to advanced levels (including higher education) and leading to initial qualifications, to adults in continuing education and training.
- TVET takes place in a variety of learning settings and contexts: in public entities like schools, colleges and universities, in various private , non-commercial and non-governmental education and training institutions, in enterprises, or in a combination of both; in formal and non-formal education and training; in informal settings, on the job or other socio-economic contexts.
- TVET has a focus on providing practical skills that can be applied directly in the labor market.
- Much of TVET in developing, but also in many developed countries, is curriculum-led and school-based.
- For a large part TVET takes place at the workplace as informal work-based learning
- TVET as part of lifelong learning or further training takes place in various institutions and serves different purposes: upgrading, re-training, specialist training, additional qualifications, etc.
- TVET also takes place in the higher education system, in the form of polytechnics and in the form of master programs.
- TVET is multiply challenged in its efforts to achieve expansion of access, improving equity, improving status, relevance and quality of TVET, to the detriment of OER uptake.

The content of TVET also has some specific characteristics that influence OER adoption:

- The expiration date of knowledge in TVET is short (shorter than in fields like languages, math or history), especially so in IT-driven areas. This puts an extra burden on updating learning materials.
- Much of the content of TVET must comply with professional rules and standards, which differ between sectors and often also between countries. This hampers large international reuse of OER.

These characteristics make it difficult to decide in specific situations how and where OER would fit and what has to be done to realize broad adoption.

One interviewee mentioned a potential pitfall when thinking about the role of OER for TVET: "OER are not a panacea for improvements in quality, access or efficiency. I find the current focus on OER potentially problematic in that it eclipses the more important aspects of institutional strategy and policy, organisational structures, ICT infrastructure management and teaching and learning. (…) If we do not focus on these other areas, it does not matter how good or plentiful the supply of OER, they will not be used effectively in TVET."

More details

Literature review report: 20, 27, 28, 45, 46, 48, 54, 92, 94, 97, 98, 100, 103

Survey report: -

Interview report: R3, R6

4.3 OER and equal access to TVET

In the literature, access in relation to OER and to TVET is used in two related meanings: access to, and access for. The first refers to the right or opportunity to use or benefit from OER for TVET, while the latter stresses the equal opportunities. In particular women are often mentioned in the latter context. OER are seen as a means to achieve both aims in TVET (Latchem, 2017a; Mead Richardson, 2009).

OER and access can also be looked at from a more economic and technical viewpoint. OER can help in achieving equal access to TVET because of their potential to decrease costs of education. Especially technical education is more expensive than regular education. OER are one option to extend access to these materials (Neal, 2011; Konayuma, 2013; OECD-UNESCO, 2016; Commonwealth of Learning, 2017a; Latchem, 2017b).

Particularly if OER are going to be used in across countries and in different contexts, they have to match the different cultural aspects as well as the educational aspects (Koroivulaono & Shashi Kerishma, 2013; Modesto, 2016; Salam & Azad, 2017).

Access to internet is problematic in large parts of the world. In the survey, 86% of the respondents mentioned this barrier from national viewpoint and 78% from institutional viewpoint.

TVET at ISCED levels 2 and 3 predominantly takes place in local/national languages. The skills to read and comprehend learning resources in another language than the local one are in many cases not present. Translation of OER into local/national languages is then necessary.

More details

Literature review report: passim

Survey report: U3

Interview report: R6

4.4 OER and cost reduction and affordability of TVET

This issue is closely linked with the previous sub chapter.

Joint production and reuse of open educational resources reduces costs. This argument of costs saving is often used in the literature to highlight the advantages of OER. But (as was already mentioned in chapter 2.6) there is a downside to this: the costs of designing and developing learning materials for open and distance teaching and skills development can only be recouped if there are sufficient users, which is for instance a great challenge in the Pacific. In the literature review, no evidence other than claims has been found to support the argument of cost savings (Neal, 2011; Konayuma, 2013; Marope, Chakroun & Holmes, 2015; OECD-UNESCO, 2016; Commonwealth of Learning, 2017a; Mabille, 2017; Latchem, 2017b).

In interviews, the research from the OpenEd group[28] on impact of OER on cost savings is mentioned. OER can increase efficiency, thereby lowering costs, by sharing short courses among institutions. This research is mainly executed in the US, on adoption of open textbooks.

Of course, there are limits to cost-reduction in TVET through the use of OER. TVET education involves in many cases physical objects (to manipulate) or laboratories. These are more expensive to produce and more difficult or even impossible to share digitally.

More details

Literature review report: 10, 54, 55, 59, 64, 79, 82, 83, 93

Survey report: -

Interview report: R2, R3

4.5 OER and quality improvement of TVET

The literature states that OER can lead to quality improvement in different areas of TVET (UNESCO-UNEVOC, 2004; Neal, 2011; Koroivulaono & Shashi Kerishma, 2013; UNESCO, 2015a; UNESCO-New Delhi Office, 2015; UNESCO-Bangkok Office, 2016; Marope, Chakroun & Holmes, 2015; OECD-UNESCO, 2016; Commonwealth of Learning, 2017a; Adala, 2016; Mabille, 2017; Isaacs, 2017; Latchem, 2017a, 2017b, 2017d):

- Quality of the learning resources

[28] http://openedgroup.org/

- Quality of the capacity of teachers and trainers
- Quality of learning
- Quality of skills training
- Quality of lifelong learning

All these are claims or expectations. It will still have to show what the actual effects of OER on quality improvement of TVET will be. Insofar as we have been able to establish in this study, no systematic research has yet been carried out into these effects.

In the survey respondents indicate that OER can contribute to quality improvement when used by teachers: improvement of their own technical knowledge and providing updated learning resources to learners. In the survey, lack of availability of suitable, high-quality OER is mentioned by 80% of respondents from both national and institutional viewpoint. These findings are also mentioned by participants in the virtual conference.

More details

Literature review report: 1, 10, 12, 14, 15, 16, 17, 20, 29, 31, 32, 47, 48, 50, 51, 54, 57, 58, 70, 76, 77, 79, 80, 81, 84, 85, 88, 89, 95, 96, 103, 104, 105

Survey report: U3

Interview report: R2

4.6 Teachers, trainers and OER for TVET

An important and crucial success factor in use and creation of OER for TVET are teachers and trainers (UNESCO, 2015b). This finding is evident from the case studies of INVEST Africa, TESSA, OER Africa, TVET Academy and the University of the South Pacific (Neal, 2011; Herd & Mead Richardson, 2012; Konayuma, 2013; OECD-UNESCO, 2016; Isaacs, 2017; Mabille, 2017; Adala, 2016; Bartley-Brian, 2017; Salam & Azad, 2017; Commonwealth of Learning, 2017a).

Interviewees indicated that in many cases teachers and trainers in TVET are experienced practitioners without sufficient pedagogical training(in comparison with higher education where it is more common to have an educational background). Concepts like “learning outcomes” or “curriculum” are not familiar to many of them. Determining which aspects of teaching and training should be done face to face and which aspects can be done online is difficult when designing a program. Finding the right resources to support both elements is another challenge for them.

Generally speaking, awareness of the existence of OER and their potential is not present amongst TVET teachers and trainers. Therefore a lot of awareness raising and guidance is needed. This guidance is often lacking. Furthermore, many teachers are not aware of the difference between OER and free access, thereby in all likelihood breaching copyrights when reproducing and repurposing the materials. In the survey, the resulting lack of awareness of OER among teachers was mentioned by 83% of respondents from both national and institutional viewpoint.

Making OER available to teachers or using OER to train them to become a better teacher is not sufficient when the teacher does not have the skills to use and repurpose them. In broader sense, ICT is a major issue. Teachers and trainers in TVET often have insufficient skills to use ICT for education

effectively. In the survey, several items addressed this (with percentages for respondents from national viewpoint respectively institutional viewpoint):

- Insufficient skills or knowledge to find/locate OER (71%, 72%)
- Insufficient technical/administrative support for locating and/or adapting OER (72%, 77%)
- Lack of availability of sufficient capabilities (e.g. necessary technical skills) (80%, 80%)

In the survey, some personal barriers to create and use OER, known to exist for other educational sectors, were asked for (with percentages for respondents from national viewpoint respectively institutional viewpoint):

- Lack of motivation to create and share OER (80%, 83%)
- Lack of motivation to use OER (71%, 74%)

When looking for OER, one of the problems the TVET teachers face is that the material is not usable in their scenario or that material doesn't really target the learning outcomes that they have set for their students. So, most of the time they have to repurpose the OER or rewrite them completely or else they have to create the OER on their own. As one interviewee illustrated: “I will give you a simple example of engine making. In a higher education scenario that is mostly physics and engineering, whereas in TVET area they have to learn how to take them apart and put them together. So using higher education material in the TVET sector is a bit difficult or it's more laborious than repurposing for higher education or repurposing for K-12.”

In the survey, lack of availability of suitable, high-quality OER is mentioned by 79% of respondents from national viewpoint and 80% of respondents from institutional viewpoint.

Finally, some organisational barriers teachers face to getting acquainted in OER adoption exist. In the survey, several items addressed this (with percentages for respondents from national viewpoint respectively institutional viewpoint):

- Insufficient time to create and find OER for reuse (68%, 75%)
- Lack of permission to use or create OER (69%, 71%)
- No assurance that OER are appropriately licensed (71%, 73%)

Participants in the virtual conference confirmed these findings, but added an additional barrier. In some areas (especially in the Global South), teachers are stimulated to create their own content and (as a reward) sell it to their learners. Because teachers need this extra income, convincing them to instead publish their materials as OER obviously is a big challenge.

More details

Literature review report: 17, 22, 23, 24, 25, 26, 27 29, 30, 31, 32, 34, 36, 38, 56, 62, 63, 64, 66, 74, 77, 80, 82, 83, 88, 93, 96, 104

Survey report: U3

Interview report: R6

4.7 Learners and OER for TVET

In the literature, two studies refer to the role of student as producer (Adala, 2016; Isaacs, 2017), and in two other studies the advantages offered by OER for self-paced, self-directed learning and training are mentioned (Koroivulaono & Shashi Kerishma, 2013; Mabille, 2017).

Non-formal TVET can benefit from OER because they do not need to work in a curriculum. But in non-formal TVET, self-regulated learning is the main way to use OER. Many of the learners in this area however do not have skills for effective self-study. These skills are not developed by taking a course; it is something regular programs should pay more attention to: becoming self-learners.

More details

Literature review report: 25, 30, 31, 71

Survey report: -

Interview report: R6

4.8 OER and skills development and training in TVET

In the literature, MOOCs are more often referred to as suitable means than OER (Fraser & Ryan, 2013; Murphy, Williams & Lennox, 2013; UNESCO, 2015b; UNESCO-New Delhi Office, 2015; World Bank, 2015; UNESCO, 2016a; UNESCO-Bangkok Office, 2016; Garrido et al., 2016; Gaba & Mishra, 2016; OECD, 2016; CEDEFOP & the European Commission, 2016; Vainio, Oksanen-Ylikoski & Yilikoski, 2017; Latchem, 2017b). In most cases, it does not concern 'open' MOOCs (a MOOC with the resources published under a Creative Commons license). OER have been mentioned by some authors in terms of instructional video courses for skills development and training.

There are many more materials available for higher education and K-12 than for TVET. Determining which aspects of teaching and training should be done face to face and which aspects can be done online is difficult when designing a program. Finding the right resources to support both elements is another challenge (see also 4.6).

In some cases, TVET education deals with proprietary materials, for example skills training in Adobe Illustrator, Photoshop or Cisco certification. This makes it hard to share openly these learning materials and, in case they are available online with free access, they are not allowed to be reworked. For many sectors TVET is very capital intensive for education and training. As was already mentioned in chapter 4.4, TVET often involves physical objects (to manipulate) or laboratories. These are more expensive to produce and to exploit, and in many cases impossible to share digitally.

More details

Literature review report: 13, 15, 16, 17, 18, 42, 44, 54, 55, 89, 90, 91, 93, 95, 99, 100, 103

Survey report: U3

Interview report: R3, R6

4.9 OER and bridging informal, non-formal and formal TVET

OER are attributed the potential for self-learning: individuals are able to access the resources from TVET institutions and qualify themselves by self-learning. If a system of certification is provided, an ecosystem of informal, non-formal and formal TVET is present. In the literature examples are given of how course materials have been developed and disseminated as OER and functioned as ways of non-formal and informal TVET. These examples are still on their own and certainly there is no trend yet (CEDEFOP & the European Commission, 2016; Adala, 2016; Shahnewaz, 2016; Isaacs, 2017; Latchem, 2017a, 2017b, 2017d)

As one interviewee mentioned, researchers and policy-makers often approach TVET education for working adult individuals as a pathway to follow, leading to certificates. Learners, however, often just want to increase their skills and knowledge and care less about a certificate. Specific assessments (workplace assessment), meeting many different occupational standards among industries, are mostly country based. This hinders sharing OER across borders.

Non-formal TVET in some countries aims at kids who are out of school or vocational trainees upscaling, but standards and certification are unclear for this target group. (See also 4.7)

More details

Literature review report: 23, 27, 28, 47, 50, 55, 100, 105

Survey report: -

Interview report: R3, R6

4.10 Validation of learning outcomes and certification

Occasionally in the literature an ideal situation is described as one in which everyone is a learner and a teacher. In this ideal world, TVET institutions have adopted outcome-based and competency-based learning, and credentialing systems are learner-centered, focused on mastery instead of time, and use formative and summative assessment to inform learning; and respond to the need for new and flexible methods to recognize and reward prior learning (Gaba & Mishra, 2016; CEDEFOP & the European Commission, 2016; Vainio, Oksanen-Ylikoski & Yilikoski, 2017; Latchem, 2017d).

But rewarding and recognition of small pieces of learning (the microMOOC or miniMOOC idea) is difficult: they do not fit into existing funding and accountability systems. A connected barrier is mentioned in 4.9: the gap between what learners want (in the opinion of some interviewees) and what policy-makers offer.

In the survey, the barrier no alignment with recognition and/or certification was mentioned by 71% of respondents from a national viewpoint and 72% of respondents from an institutional viewpoint.

More details

Literature review report: 42, 47, 90, 100

Survey report: U3

Interview report: R3, R6

4.11 Involvement of public and private sector

As already has been said (paragraph 2.6) involvement of the private sector in OER for TVET is rare. This might have to do with a lack of awareness of the potentials of OER for TVET. More generally, it is asserted that often there is lack of awareness amongst all stakeholders, including governments. OER do not yet play a role in many national policies, due to a low awareness of the potential of OER (Neal, 2011; Varis, 2013; Kanvaria, 2013; Technopolis, 2016; Gaba & Mishra, 2016; Jayalath, 2017; Adala, 2016; Seelig & Nichols, 2017).

Non-awareness of OER and its opportunities is also a problem on the level of policy makers in many countries. Capacity building and sensitizing are essential activities to create this awareness.

Activities to improve uptake of OER are short-term funded, and in the case of non-formal education largely from NGO's rather than governments. So not only do the projects not persist. But there's very little communication between them and it's impossible to come to many really overall conclusions.

Compared to higher education, TVET institutions are usually smaller.

One interviewee from the Global North replied that 'OER' nor 'openness' is an issue in TVET at this moment. This has to do with the predominant focus in TVET on practising skills and learning by doing, especially for the ISCED levels 2 and 3. Perhaps it even holds true for ISCED level 4, according to this interviewee. Furthermore, at least in many European countries, for a large part TVET takes place within the realms of private companies. Within these contexts, learning materials are not an important issue, let alone the specific characteristics of openness of learning resources.

One interviewee indicated that within his TVET institution the publishing department was considered a profit center. OER would be detrimental to this.

In the survey, lack of awareness of OER among policy makers was mentioned by 84% of respondents from a national viewpoint and 81% of respondents from an institutional viewpoint. Participants in the virtual conference mentioned the same experiences. Several examples of collaboration and cooperation between educational institutions and public or private sector were mentioned in the virtual conference, but with no or no clear involvement of creating or using OER.

More details

Literature review report: 28, 43, 59, 87, 90, 92, 97, 98

Survey report:

Interview report: R2, R6

5 Open Educational Resources for TVET: the need for cooperation

5.1 Introduction

In this chapter, findings concerning the need for cooperation and forms of cooperation between important stakeholders at policy level are presented. We have classified the information obtained into the following subjects:

- Challenges that motivate closer cooperation between stakeholders at policy level
- Important stakeholders and their role for OER in TVET
- Role for UNESCO and UNESCO-UNEVOC International Centre

5.2 Challenges for policy and motives for cooperation

From the literature reviewed, a general view emerges that governments are to play an important role in adopting OER in TVET. This view, however, may be prompted by the literature selected. Only publications have been taken into consideration in which OER for TVET is thematic. But if we look at publications which take a broader view of TVET (e.g. UNESCO-Bangkok Office, 2016, OECD-UNESCO, 2016 and the World Bank, 2015), it may be observed that TVET is multiply challenged in its efforts to achieve the goals of expansion of access, improvement of equity, improvement of status, relevance and quality (Latchem, 2017d). To meet these challenges governments have an important role with regard to TVET, and we might add, consequently with regard to the adoption of OER in TVET. According to Marope, Chakroun & Holmes (2015), rightfully TVET has risen to the top in global debates and government priorities for education and national development.

Latchem (2017a) has summarized the challenges that societies and governments are facing. Worldwide TVET is the major 'producer' of the future workforce. The sector is thus responsible for aligning education and training to enable future workers to take on responsibility for responding effectively to the principles and needs of the sustainable development agenda. There is a surge in demand for post-secondary education, training or work. Secondary education is still reserved for a privileged fraction of the population in most countries.
According to Latchem (2017d) the best option for many of the uneducated, undereducated and even for qualified unemployed young people appears to be to help them develop the knowledge and skills needed for self-employment or for establishing micro, small and household enterprises. Building skills in the informal sector, however, will require a paradigm shift with regard to the design of the technical and vocational skills development, financing and certification systems (ibid).
Girls/women and boys/men should have equal access to TVET. Consequently, all courses, curricula, materials and work based learning should avoid gender bias and stereotyping and help achieve gender equality.

To meet these challenges, not only TVET has to change profoundly in terms of conceptualization, governance, funding and organization in order to ensure that the sector is capable of responding effectively to the many economic, equity and sustainable transformational challenges. Greater national and international collaboration and sharing of research findings, knowledge, experiences and promising practices are also needed (Latchem, 2017a, 2017d, 2017e).

From the interviews and from the survey, many reasons can be derived which motivate a need for a closer cooperation between stakeholders: countries, institutions, teachers and trainers, public and private, formal and non-formal TVET. Some of these motives are in challenges TVET and innovation of TVET in general face in many countries.

TVET is regarded as a sector with lots of problems regarding status and quality. Although OER can make a major contribution in solving these problems, it is hard to get stakeholders interested: the problem of how to improve uptake of OER is considered less relevant compared to other problems the sector is facing. In many countries, TVET gets less funding than higher education. Some interviewees even mention that in their countries TVET has been neglected for dozens of years.

With regard to OER for TVET, a great challenge is that OER do not fit in to the dominant business models of TVET institutions, both public and private. Activities to improve uptake of OER are short term funded, and in the case of non-formal education largely from NGO's rather than governments. So not only do the projects not persist, but there's very little communication between them and it's impossible to come to far-reaching conclusions. Cooperation could take advantage of economies of scale.

When innovation in TVET is an issue, mostly the focus is not on the learning resources used or to be used, but on adapting and changing the teaching and learning approaches, e.g. blended learning or distance learning.

TVET has also a much larger non-institutional element compared to higher education, e.g. private companies and NGO's are involved or take initiatives for TVET. Specific assessments (workplace assessment) are needed, there are many different occupational standards among industries, and in most cases country based. To realize effective TVET education and adoption of OER, cooperation between these stakeholders is almost a necessity. OER could even contribute to realizing this (being a means to a larger end).

Currently, many initiatives on OER or (broader) innovating TVET are local (in a country or in an institution). There is no common platform (e.g. to share learning materials or to share experiences) and no coordination, making it an inefficient process. As one interviewee formulated: "I was surprised at how little there was out there: usable materials, methodology for implementing, what makes sense in TVET, can you do practical training through existing open educational resources? Is there something that's good or is it very country specific? I mean, there is just nothing we could really get our hands on and what we could do to be implemented in this program."

The majority of research done on OER is about higher education. As one of the interviewees formulated: "I came across a study that showed that the number of people in the world who go to university is 6.7%. So what are we doing for the other 93.3%?" To get insight into impact of OER and effectiveness of interventions, more research and cooperation in that field between stakeholders and research institutions is necessary.

Some items in the survey support the importance of closer cooperation:

Potential contributions of OER for TVET: Stimulating of sharing and collaboration between institutions and countries is considered (very) important by 91% of respondents from a national viewpoint and 86% of respondents from an institutional viewpoint.

OER in TVET having no alignment with recognition and/or certification is considered a (big) challenge by 71% of respondents from a national viewpoint and 72% of respondents from an institutional viewpoint. Cooperation between institutions and (national or international) recognition bodies could help solve this challenge.

To break down the boundaries between formal, non-formal and informal TVET as a motive to use OER in TVET is considered a (very) important motive by 85% of respondents from a national viewpoint. Reducing public and private costs of TVET is considered a (very) important motive by 90% of respondents from a national viewpoint.

More details

Literature review report: 9, 15, 17, 45, 46, 47, 48, 51, 83, 93, 105

Survey report: U0, U3, U4

Interview report: R3, R6, R9

5.3 International cooperation

As already mentioned in the previous paragraph, there is much to be gained from cooperation between all stakeholders in TVET. In this paragraph we will focus on the subject of international cooperation. With reference to that, in the literature reviewed the following subjects have been brought to the fore:

- Identification and international featuring of 'flexible and blended TVET champions' (Mead Richardson, 2009; Latchem, 2017b)
- International collaboration between TVET institutions and between TVET institutions and industry in these sectors in creating high-quality generic online courseware in the form of OER and open MOOCs that everyone across the system can then share, adopt, adapt, customize, update and use in whatever ways and contexts they wish (Latchem, 2017b)
- Such collaboration can also help catalyze new ideas, knowledge, skills and practices (ibid.)
- Setting up of international repositories of training materials and case studies of best practices (ibid.; Commonwealth of Learning, 2017a)
- Collaboration and sharing of research findings, knowledge, experiences and promising practices (Latchem, 2017d; Commonwealth of Learning, 2017a). Strengths and weaknesses of a country's national TVET system can be benchmarked against international experience and best practices from high-performing systems around the world and then policies can be developed that can transform better skills into better jobs, economic growth and social inclusion (OECD-UNESCO, 2016).

In the interviews several experts emphasized the need for international cooperation in order to learn from experiences, realizing a more efficient process of mainstreaming OER in TVET. This kind of cooperation would advance international sharing of learning materials, as illustrated by one interviewee: "I think it's efficient in the sense of not recreating identical material all over the world. Everyone needs a course in water, everyone needs a course in combustible engines, but we don't need it everywhere in the world. We don't need 20 examples. We need one example then we can open license it and (...) and adapt it." This kind of cooperation is especially useful for small countries

which lack finances and experts to realize an OER uptake. Another suggestion for international cooperation was: awareness raising of the importance of producing open courseware in sectors of the economy in which international standards apply. Countries with a sound TVET system and experiences in OER for TVET could also play a role model for other countries in similar activities.

As to the subject of international cooperation, several organizations have been mentioned. First, the 'usual suspects', Commonwealth of Learning (already carrying out many projects and supporting activities) and UNESCO (especially for awareness raising on policy level). Next to these, the following other organizations have been mentioned in the interviews:

- Open Education Consortium (raising awareness)
- European Commission, especially for the TVET education described as ISCED 4.
- World Bank. Depending of the context, they could be funding activities in the TVET sector, or helping governments in plan building and identification of priorities.
- Asian Development Bank, funding and support for projects in the Asian region.
- Private industry. As formulated by one interviewee: "In essence, we in education are producing employees for private industry. So why isn't Siemens or Daimler Benz or General Electric or Microsoft funding much of this cooperation?" Another interviewee stressed the importance of cooperating with private industry in this area: "I think the collaboration, the intersection between the educational institutions and industry has to be in its heart. Otherwise it will not be successful. TVET has a long tradition in establishing relationships with its surrounding environment. (…) It is three parties in partnership between governments, educational sector and industry sector which makes it a success."
- International Labor Organization (ILO), especially to work on standardization of occupational standards

Awareness raising, policy development, (seed) funding and capacity building are mentioned as the main activities in which these organizations should cooperate.

An issue mentioned by one interviewee is that development partners are not integrating OER, technology and innovative approaches in program design documents. Even UNESCO in some cases, when supporting national TVET policy development, does not mention OER in those documents because the people involved are not aware of OER.

More details

Literature review report: 17, 47, 50, 54, 55, 56, 69, 81

Survey report: -

Interview report: R9

5.4 Role of UNESCO and UNESCO-UNEVOC International Centre

In the literature reviewed, publications by UNESCO and its institutes excluded, no explicit statement about the actual or expected role of UNESCO and/or UNESCO-UNEVOC with regard to the uptake of OER in TVET has been found. Currently, UNESCO focuses on policy, advocacy, discussions in TVET Forum, curating repositories; ensuring that in all aid programs, OER and non-traditional delivery

modes are part of project design. Next to that, in the previous chapters, UNESCO is already mentioned as playing a role in awareness raising on policy level.

Some interviewees mentioned UNESCO should advocate more in the TVET area, especially targeting teachers who are in most cases using traditional teaching methods. The region definitions UNESCO uses is mentioned as a barrier (e.g. considering Cyprus as part of the Asia region).

The main issue with UNESCO however, mentioned by several interviewees, is the lack of money to realize their ambitions.

Participants in the virtual conference have confirmed the important role of advocating OER. Other activities mentioned include creating OER platforms with courses to create OER awareness, provide support in terms of assessment and evaluation of open content and develop policy formulation models and frameworks that governments and institutions can use, modify and apply.

More details

Literature review report: -

Survey report: -

Interview report: R9, R10

6 Discussion, conclusions and recommendations

6.1 Introduction

In this study, we have made a systematic literature review of "OER for TVET"[29], in order to find out what the potential contributions of OER to this task can be. The information from the review has been supplemented with data from an online survey and with information from 10 interviews with TVET experts and from a virtual conference on the UNESCO-UNEVOC Forum. We now present the conclusions and recommendations.

6.2 Discussion and conclusions

TVET covers a broad range of education and training. It concerns young people gaining knowledge and skills from basic to advanced levels (including higher education) and leading to initial qualifications, to adults in continuing education and training. TVET takes place in a variety of learning settings and contexts: in schools, colleges and various other education and training institutions, in enterprises, or in a combination of both; in formal and non-formal education and training; in informal settings, on the job or other socio-economic contexts. Changes in the world of work require that people need to update frequently their skills and competences at their workplaces. Another consequence is that people more and more are required to perform changing tasks. These developments lead to an increase in informal on-the-job learning, and henceforth of formal recognition of these learning activities. These developments also lead to new demands to the knowledge and skills base of the initial vocational education and training (Orr, 2017; Dohmen, 2017).

All this makes TVET a crucial element in enabling the learning society. It is a key to provide citizens with the skills necessary to fully benefit from the digital transformation (Latchem, 2017a, 2017d; Orr, 2017; Dohmen, 2017). According to Marope, Chakroun & Holmes (2015), TVET is gaining attention because of its potential to contribute significantly to the development of the skilled, knowledgeable and technology-savvy people required to support accelerated, sustained and shared growth.

To realize this potential, however, current TVET systems have to acquire agility to stay current and responsive to the quickly changing contextual demands. Open Educational Resources have the potential to contribute to this required agility of TVET systems. One of the problems of learning materials, especially in sectors facing fast developments driven by ICT, is to keep up with actual developments. To update learning materials is very often a costly and time-consuming process. The expectation is that collaborative development of resources by TVET institutions, cooperation between TVET institutions and industry, and sharing, reusing and repurposing resources in the form of OER are ways to cope with these challenges. In this way, OER may contribute to more agility of TVET systems.

Our study has been exploratory. Our search of international publications databases led initially to 770 resources. A further examination of the abstracts of these papers, reports and book chapters, and when available full texts, limited the initial collection to 45 publications under the restrictions: published in English language, online accessible and retrievable, and "OER/MOOC and TVET" as

[29] As we have specified in Chapter 1, we have included MOOCs in so far as educators and educational institutions are allowed to use and re-use the educational resources of the MOOC freely with the 5R permissions.

issues referred to. The collection of publications was supplemented with articles and reports mentioned in references in the initial 45 publications and which after reading seemed relevant. In later stages of the study some publications were added resulting from discussions on the 2nd OER World Congress or suggested by interviewees or during the virtual conference. We do not claim that our overview and analysis is exhaustive and complete. On the other hand we think that our study provides a reliable picture of the current state of affairs regarding research into OER in and for TVET. We have done triangulation of the information of the literature review through survey and interviews. The findings in each of these three strands did not contradict each other (except on the one issue of private sector involvement where the survey was much more positive than the other resources). The overall picture we have sketched in our draft report has been confirmed by the issues raised and discussed and conclusions drawn during the virtual conference.

So, it is fair to state that our study has revealed that there are not many publications which deal with OER in and for TVET. On this basis we may argue that OER in and for TVET is not an issue researched and discussed in international literature comparable to OER in higher education or secondary and K-12 education. This absence calls for action.

From the available literature, on a global scale there emerges a highly uneven pattern of projects and programs: there are countries in which OER's awareness must still arise, while other countries have formulated (partial) policies on OER in TVET. An example of a partial policy is the Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program of the American Federal Government, as described in section 2.8.

We have identified and discussed a number of projects and programs in which OER for TVET play an important role. In nearly all projects and programs identified, the main target group in activities to realize mainstreaming OER in TVET are teachers and trainers. When it comes to such programs, the Commonwealth of Learning is currently the most important international stakeholder in the field of OER in TVET.

The study has found broad support for the opinion that OER in TVET has big potentials for accomplishing the task of skilling people. But it is also found that a large gap exists between asserting this opinion and activities to actually adopt OER in TVET.

One of the conclusions that can be drawn from our study and from programs like INVEST Africa, the Virtual University of the Small States of the Commonwealth and the University of the South Pacific in particular is that it confirms what Latchem (2017b) already had concluded with regard to ICT for TVET: adoption of OER calls for more than a series of one-off interventions, projects or funding. Profound adoption of OER in TVET requires the creation of education and training ecosystems of TVET wherein stakeholders at different levels, institutional, sectoral, national and international, acknowledge the value of OER, and agree to cooperate and share information and resources. Inclusion of and engagement with national government and stakeholders are a prerequisite, and it requires at national level an enabling policy for innovation of TVET in general and adoption of OER in TVET in particular.

Lessons learned from INVEST Africa are that adoption of OER in TVET at institutional level requires changes, not only in the ways of teaching and learning. It also requires institutional policy and capacity planning, most likely also the adaption of organizational structures, innovative staff and

teacher development, ICT skills development, and instructional design capacity development (flexible and blended model of TVET, and OER for TVET) , and last but not least adequate (ICT) infrastructures. This advocates for programs where adoption of OER is part of a larger innovation program (e.g. the implementation of a flexible and blended learning program).

A too strict focus on adoption of OER is also not recommended for other reasons. The survey has shown that in the reality of TVET, people appear to have a much broader view of 'open' educational resources than the internationally accepted definition, which we have used in this research. This may be concluded from combining the question in the survey in which respondents were asked to rate themselves in terms of experts in OER, and the question wherein was asked whether one knows what the CC-BY logo stands for. 39% of the respondents who indicated to be (somewhat) expert in OER, did not know the meaning of the logo or had never seen it. For respondents who are teacher or trainer, this mismatch between OER expertise and knowledge about the CC-BY logo even is 53%. One might conclude from this that there is a great non-awareness of what OER in strict sense is. On the other hand we may also conclude that people who are experienced in TVET have in practice a broader view of openness with regard to educational resources for TVET than OER defined as free plus 5R's permissions.

For non-formal and informal self-learners, free access to educational resources is important, much more so than the right to repurpose them as expressed in an open license. The reported massive use of Youtube is an illustration, as are the opportunities that freely available MOOCs can offer. For educators, however, the rights to re-use, remix, adapt and retain (, the 5R rights, under the conditions an open license prescribe) are important, because within TVET in many cases educational resources need to be repurposed to fit into the context of use. But, given the major challenges facing TVET, it would already be a big step forward when many more educational resources become freely available and accessible, even without the 5R rights. This could be a stepping stone towards a broader adaption of OER in TVET. Our study has shown that in TVET practices openness is a continuum ranging from access to freely available materials to the use of OER in the free and 5R's sense.

The best option for many of the uneducated, undereducated and even qualified but unemployed young people appears to be to help them develop the knowledge and skills needed for self-employment or for establishing micro, small and household enterprises. Building skills in the informal sector, however, will require a paradigm shift with regard to the design of the technical and vocational skills development, financing and certification systems.

The characteristics of TVET (skills development, learning by doing) and its learners (no or little competencies for self-regulated learning) makes that self-regulated learning in TVET cannot gain much attention. This means the added value of OER in several areas of TVET is non-existent for learners (other than financial), but existent for teachers and trainers.

On the basis of the information and data collected in this study it is reasonable to state that OER for TVET has not been an issue researched and discussed in international literature comparable to OER in Higher Education or K-12. The OER Knowledge Cloud database, which may be qualified as the source of open access research on OER, does not contain one article, book chapter or report on the subject. In the online library of UNESCO-UNEVOC no publication about OER for TVET was found either. This may be explained by characteristics of TVET: complex (many stakeholders involved,

mixture of formal, non-formal and informal), practitioners as teacher (not speaking the "educational language"), lack of standards, language barrier because of less educated learners and (too) little attention on policy level.

And a last illustration of the gap between intention and implementation, in countries with a historically grown adequate TVET infrastructure (Germany, Sweden, Finland), OER has no priority.

Some of the characteristics that make TVET a complex area urge for close cooperation between stakeholders to realize effective TVET education and adoption of OER. OER could even contribute to realizing this (being a means to a larger end).

Ultimately, OER in TVET is about equal access to quality education, thereby contributing to SDG 4. Access in relation to OER and to TVET is used in two related meanings: access to, and access for. The first refers to the right or opportunity to use or benefit from OER or TVET, while the latter stresses the equal opportunities. In particular, women are often mentioned in the latter context. OER is seen as a means to achieve both aims in TVET. Equal access can also be looked at from a more economic and technical viewpoint. OER can help in achieving equal access to TVET because of their opportunity to decrease costs of education. Especially technical education is more expensive than regular education. In some cases OER can provide an option to extend more equally access to these materials. In this respect, are there lessons to be learned from other educational sectors with regard to the adoption of OER?

OER activities happen at all levels of education. Data from the Open Educational Resources Global Report 2017 suggest that most OER activity appears to be at the secondary and post- secondary levels: secondary education 67.6%, followed by post-secondary education 59.8%, tertiary education 53%, and primary education 50%. In the 2012 Report the highest levels were at the tertiary level (Commonwealth of Learning, 2017b). Many of these OER activities are related to formal education and their respective educational institutions. The Open Education Group[30] has collected findings of many studies on the impact of OER adoption. The following sections are based on their findings.

The most popular and most discussed benefit of adoption of OER is decreasing costs. Across many studies in various settings, students consistently reported that they faced financial difficulties without using OER (in most cases in the form of open textbooks) and that OER provided a financial benefit to them. There is substantial empirical evidence that using OER instead of traditional publisher textbooks or digital materials will save learners money. These outcomes hold for post-secondary and K-12 (USA) contexts.

Another benefit from the adoption of OER in secondary and post-secondary education is that it increases student access to learning materials. At http://openedgroup.org/review, research is collected that support this claim.

A much researched topic in OER for secondary and tertiary education is: what do teachers, trainers, faculty and students think about, and feel toward, OER? Also on this topic, the Open Education Group has collected and analyzed the findings of many studies. In total, more than 25,000 students have utilized OER materials across the studies that attempted to measure results pertaining to

[30] http://www.openedgroup.org

student efficacy. These students' results were compared with approximately 100,000 students using traditional textbooks. A general finding of all these studies is that at least half of teachers and students find OER to be comparable to traditional resources, a sizeable minority believe they are superior, and only a smaller minority consider them inferior. While causality was not claimed by any researcher, the use of OER was sometimes correlated with higher test scores, lower failure, or withdrawal rates. In only one efficacy study more students performed worse than better, and even in that study the majority of students achieved the same results as their peers using traditional textbooks.

To some extent, these findings are relevant for OER for TVET. They show that (1) students and teachers generally find OER to be as equal or better quality than traditional textbooks; (2) students do not perform worse when utilizing OER, and (3) learners save literally much money without any negative impact on learning through the adoption of OER. Since a large part of TVET is secondary and postsecondary education, it may be assumed that similar advantages of cost reduction may also occur in TVET. Using OER in TVET will most likely lead to lower costs, especially for learners. Furthermore it is fair to assume that the free and open availability of educational materials may well increase the accessibility of TVET. And thirdly, the adoption of OER will not cause lower failure or withdrawal rates in TVET. It should be borne in mind though that the Open Education Group has looked at impact of OER defined as "free" and "open" in terms of 5R's (see section 1.3).

In this study, we have observed that teachers and trainers play a crucial role in the uptake of OER. If a breakthrough in OER for TVET is foreseen, teachers need to be the key players. They need training, support, certification, incentives, time and opportunity to practice a new level of professionalism that empowers them to exercise all of the benefits of open education. Therefore, in most projects and programs identified, the main group targeted are teachers and trainers. The line of thought that is evidently fulfilled is the following: OER can be useful for training skills in a specific domain. To be able to realize that benefit, educators and trainers must have the skills to publish, find and adapt OER. To acquire those skills, OER can be used. Therefore, many projects are focused on awareness raising and capacity building among teachers, and for this OER are seen as important instruments. In many of these projects manuals, teaching guides and complete courses for teachers and trainers have been produced about 'what are OER and how to use these' and all these have been published, of course as OER. These manuals, teaching guides and courses can be used and adapted for TVET.

But this concerns only one factor determining the adoption of OER by teachers. From research by Cox & Trotter (2017) on adoption of OER by teachers/lecturers, it follows that whether or not teachers adopt OER is dependent on the interplay of different factors. Some of these factors are within the realm of lecturers' personal control while others are less so, or are out of their control entirely. In order to capture this complexity, they developed an analytical framework called the "OER adoption pyramid", which consolidates the essential OER adoption factors into six categories, layered according to the level of control that individual lecturers have over them. Moving from factors that are more externally determined (bottom) to those that are more internally determined (top), they are: infrastructure *access*, legal *permission*, intellectual *awareness*, technical *capacity*, educational resource *availability* and individual (or institutional) *volition*. The model suggests a certain prioritization of factors from the viewpoint of lecturers, in that the factors at the bottom – which are largely externally determined (by the state or the institution) – form a foundation upon which personal volition can be expressed. Without the factors at the bottom being positively provided for,

it is difficult for the factors at the top to make much of a difference to eventual OER engagement of teachers (Cox & Trotter, 2017). This is also a lesson to be learned for the uptake of OER in TVET, taking into account the specific characteristics of TVET as mentioned earlier.

6.3 Recommendations

Derived from the findings of the literature review, the survey, the interviews and the virtual conference, in the following we formulate our recommendations for UNESCO-UNEVOC:

Awareness raising and advocacy

- Foster awareness raising at policy level about the understanding and relevance of OER.
- Improve the understanding and promote the use of open licensing frameworks for educational, learning and training resources in TVET, and encourage the open licensing of educational resources for TVET produced with public funds.

Policy development

- Encourage and reinforce the development of national strategies and policies on OER in TVET.
- Encourage and support practices of development and adaption of OER in TVET, in different cultural contexts.
- Develop models, frameworks and guidelines for policy formulation and implementation with regard to OER for TVET that governments and institutions can use, modify and apply.

Capacity development

- Provide support for capacity building amongst TVET institutions, trainers and educators.
- Provide support for developing guidelines for customizing OER to local/national contexts.

Standards setting

- Develop guidelines for policy formulation for governments and institutions.
- Provide support for building systems for quality assurance of OER in TVET and for harmonizing existing quality systems.

Partnerships and cooperation

- Foster strategic alliances with various stakeholders in the public and private spheres.
- Encourage research on OER for TVET.

One approach that would be feasible is to systematically collect information about 'good practices' of OER for TVET. These good practices can be a starting point for implementing the formulated recommendations.

These recommendations are in line with those drawn at 2nd OER World Congress in Ljubljana in September 2017 which have resulted in the Ljubljana OER Action Plan 2017. Under the theme "OER

for Inclusive and Equitable Quality Education: From Commitment to Action", the congress finalized an Action Plan for lowering barriers that hinder mainstreaming OER, including building capacity of users to find, re-use, create and share OER and developing supportive policy environments.

Other recommendations apply to collaboration and cooperation and an approach to widen adoption of OER in TVET.

Collaboration and cooperation

Collaboration between institutions in the public and private spheres can make the development of OER more sustainable, since use can be made of an extensive range of knowledge, skills and experiences and the credibility of the training materials can be enhanced. Therefore, organize, start with or intensify cooperation and collaboration (e.g. via consortia) with important stakeholders in the field of OER in TVET: Commonwealth of Learning, International Labor Organization, World Bank, Asian, African and Latin American Development Banks, Organisation for Economic Cooperation and Development (OECD).

Approach

Embed activities on adoption of OER in TVET in larger programs using ICT to innovate TVET. In these programs, address institutional strategy and policy, organisational structures, ICT infrastructure management and teaching and learning to realize a fertile environment for effective use and supply of OER.

National and international repositories of training materials and case studies of good practices can be created. National and international "OER-TVET champions" should be featured to motivate, mentor and enable teachers to develop their eLearning capacities.

Organize systematic gathering of information and evidence base through research, monitoring and evaluation in ways that are participatory and inclusive. In particular, gathering evidence about the costs effectiveness of adoption of open licensing arrangements and harvesting existing OER. This is important information for institutions making strategic decisions to increase their levels of investment in the design and development of better educational TVET.

Together with the International Labor Organization, start a feasibility experiment for standardization of country-based occupational standards to a more global standard. For this experiment, take an area which is already operating internationally and, for reasons of security or insurance, is already heavily standardized.

Finally, some closing remarks. So far, global OER research and the global OER community has focused heavily on higher education and more recent on college education. There is still insufficient attention for TVET and the specific issues and challenges involved. Our assumption is that if the open education movement does not pay more attention to OER in and for TVET, OER will broaden the gap between those who have access to quality education and those who don't. Furthermore, based on previous studies and experiences, there is a real danger that OER is considered to be a "silver bullet" for all challenges TVET is facing. This requires careful management of expectations to avoid disappointment with stakeholders.

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Appendix 1 Virtual conference on OER in TVET

Introduction

The UNESCO-UNEVOC virtual conference on OER in TVET was held between 9 and 20 November 2017 via the TVET Forum[31]. The objective of the virtual conference was to inform the wider TVET community about and to discuss with them the general findings of the study. An additional goal of the Conference was to share information, experience and knowledge of OER in TVET, to be used as input for the final report as well as into wider UNESCO practices.

Process

During the conference, 5 topics were addressed and discussed in the forum. The topics were:

- Topic 1: How important is openness?
- Topic 2: Teachers and trainers
- Topic 3: Collaboration and cooperation with government and private sector
- Topic 4: Learning from good practices
- Topic 5: What do you expect from UNESCO-UNEVOC when introducing OER in TVET?

Participants could register for the conference, but that was not mandatory; an account on the TVET Forum was sufficient to gain access to the virtual conference. Participants were asked to introduce themselves on the forum.

Each second day, a new topic was introduced on the forum by an initial statement from the researchers. For topics 1 and 4, a 1 hour webinar was organized:

- Webinar topic 1: Creative Commons Licenses. By Cable Green, Director of Open Education at Creative Commons
- Webinar topic 4:
    - TVET OER, Practice from the field in the Commonwealth. By Alison Mead Richardson, Education Specialist Technical and Vocational Skills Development at Commonwealth of Learning
    - The Development of Open Education Resources (OER) for the Caribbean Vocational Qualification (CVQ) Assessor Training. By Pauline Whiteman, Senior Manager, Programme Development & Management Department, National Training Agency Trinidad and Tobago (NTATT)

During the webinars, participants could discuss with the presenters using chat. The last day, a webinar with a wrap-up of the Conference by the two researchers was organized. Recordings of the webinars and the slides used were made available on the forum directly after closing.

[31] http://www.unevoc.unesco.org/go.php?q=e-Forum+-+Virtual+Conferences

Statistics

The Conference had 204 registered participants from 57 countries. This equals to 3.8% of the total number of registered users on the forum. In Figure A1, the division of the participants over the world regions is displayed.

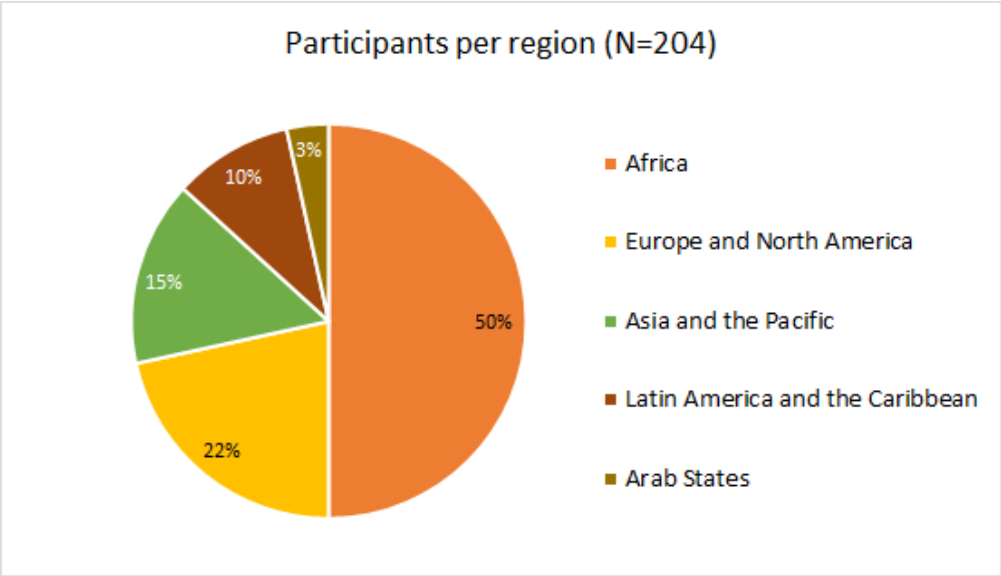

Figure A1 Participants per world region

In figure A2, the countries with 3 or more participants are displayed.

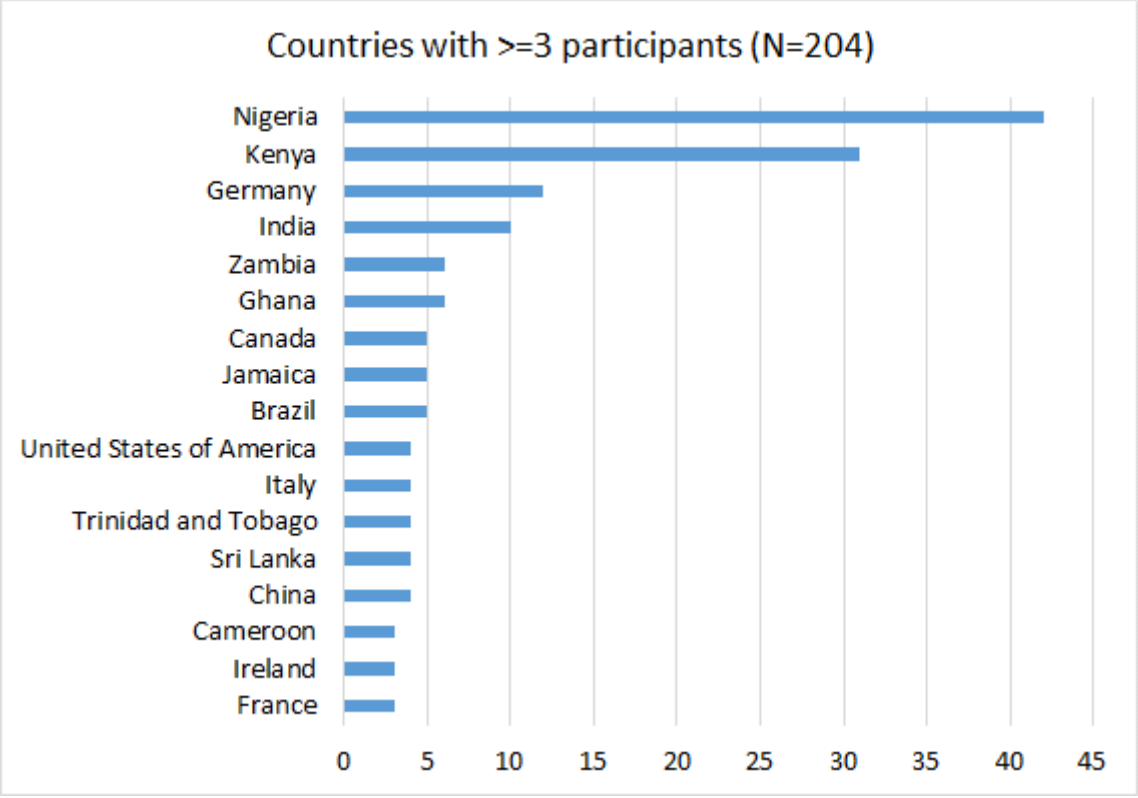

Figure A2 Countries with 3 or more participants

The webinars attracted 13 participants (topic 1), 15 participants (topic 4), respectively 12 participants (wrap-up webinar), including the two researchers and the moderator from UNESCO-UNEVOC.

The following table provides an overview of the number of posts per topic.

Topics	**# Posts**
Introduction of participants	72
Topic 1: How important is openness?	33
Topic 2: Teachers and trainers	30
Topic 3: Collaboration and cooperation with government and private sector	13
Topic 4: Learning from good practices	8
Topic 5: What do you expect from UNESCO-UNEVOC when introducing OER in TVET?	6

Findings

Per topic, we have identified the key points of the discussion in the Conference. Hereunder, per topic the initial statement from the two researchers about the topic is presented, followed by a summary of the discussions in the forum.

Topic 1: How important is openness?

Initial findings of the current research project have shown that OER nor 'openness' are an issue yet for TVET. Various forms of freely available resources are being used in TVET. Teachers, trainers and learners in TVET have a much broader view of what open educational resources are than the UNESCO definition.

Based on these findings we had formulated the following opinions on the relevance of openness for TVET. Each opinion entailed a perspective from which the relevance of openness of educational resources for TVET can be looked at.

We asked the participants to comment on these opinions and to describe their own experiences.

TVET learner's perspective: only free access to whatever resources are available on the Internet is important, not the rights to adapt, to reuse or to retain. From this perspective copyright issues are almost non-existent.

TVET teacher's / **trainer's perspective**: free access to whatever resources are available on the internet is not sufficient. The rights to repurpose and adapt these resources are also relevant. From this perspective, copyright issues are real and openly licensed materials (OER) provide possibilities to use and share digital educational materials.

Quality perspective: free access to resources on the internet is important to improve the quality of TVET. Openly licensed materials (OER) with the additional rights for the user as described before are nice to have, but are less important for improving the quality of TVET.

From the discussions we have summarized the following.

Many participants agree with the statement that open licenses (free and 5R's) are important for teachers as means to create better learning experiences and thence of to improve the quality of TVET. Awareness of the relevance and possibilities of OER among teachers however is low. One participant mentioned use of OER by learners as a means to teach about awareness of plagiarism (having them exposed with reusing OER where the attribution is always necessary).

For learners, free access to resources on the internet matters. One of the participants stated that for learners free access to whatever resources is more important than the rights to reuse, adapt or retain. Question then, however, is: what is meant by "free access", and under which conditions?

From the quality perspective, teachers and trainers need rights to adapt resources to context and thus be able to create better learning experiences. Quality of OER is important to sustain the perceived value of OER. High quality OER are considered an important element for continuous professional development in the vocational areas. Robustness of the educational system or TVET system in a country regarding quality assurance determines quality of OER in TVET. But the ultimate check on quality is: has the learner really learned something?

Topic 2: Teachers and trainers

One of the results of the study is that teachers and trainers are crucial success factors in the adoption of OER in TVET. This finding is evident in projects and programs such as INVEST Africa, TESSA, OER Africa, TVET Academy and the University of the South Pacific.

Often teachers and trainers in TVET are experienced practitioners without a proper educational qualification. Concepts like blended learning, flipping the classroom or learning outcomes are not familiar to many TVET educators. Awareness of existence of OER and its potential is scarcely present. Furthermore, many TVET educators are not aware of the difference between OER and resources with only free access, thereby highly possible breaching copyrights when using or repurposing the materials.

Because in TVET OER are often not aligned to the specific context of use (e.g. wrong language, not aligned to the learning outcomes), repurposing OER is often necessary. So making OER available to TVET educators does not yield effect when they don't have the skills to use and repurpose them. This relates to a broader problem in TVET: many teachers and trainers in TVET have insufficient skills to use ICT for education effectively. Last but not least, in the survey TVET educators have indicated that they face several organizational barriers.

We asked the participants: will this suffice, or are other measures needed? And if so, what are these measures?

The following support measures were mentioned in the discussions:

- FAQ for pedagogy related questions
- Local handbook
- Training
- Use of Vocational MOOC (VOOC)
- Take Youtube and Skillscommons.org as starting point
- Support from instructional designers

Concerns mentioned are:

- Lack of access to internet in developing countries. The Aptus, developed by the Commonwealth of Learning, could maybe solve this problem[32]
- Lack of awareness (both among teachers and policy makers), lack of ICT skills among teachers and finding the right resources are mentioned as the main challenges that hinder wide adoption of OER in TVET
- In some areas (especially in the Global South), teachers are stimulated to create their own content and (as a reward) sell it to their learners. Because teachers need this extra income, convincing them to instead publish their materials as OER obviously is a big challenge.

Personal initiatives are considered important to realize an uptake of OER, as is quality assurance through peer review.

Topic 3: Collaboration and cooperation with government and private sector

There is a great need for TVET to respond adequately to the challenges in the labor markets. One way of doing this is that private sector and industries engage in the production of resources for skills development and in the actual skills development itself. Recent trends in ICT and TVET put emphasis on the innovation of education and training. Attention is given to the upgraded and new skills and competences needed by modern firms as well as the working population. A joint dialogue with the industries is needed to create feedback loops to ensure that TVET institutions remain informed about changes in the economy and changes in the need in (anticipated) skills and competencies.

But if we take a look at actual involvement of the private sector, in our study we have found very few examples of actual involvement of private sector in the production of OER. Some interviewees indicated that private companies but also educational institutions were unwilling to contribute to the production of OER for financial reasons; they rather sell the learning content. It was also pointed out that in some cases (mostly in the area of ICT) proprietary learning materials are used which cannot be published as OER. Also the lack of awareness about OER and its opportunities for TVET, both among private institutions as among policy makers from institutions and governments, was mentioned several times in the interviews and by more than 80% of participants of the survey.

Cooperation between TVET institutions and between institutions and business can make OER more sustainable, based on a wide range of knowledge, skills and experience, thereby contributing to greater credibility of educational resources.

We asked the participants: what measures could be taken to achieve (better) cooperation? Do you have experiences with cooperation between TVET institutions among themselves, or between TVET institutions and industry? If so, how did that work out? What lessons can be shared from good practices?

Overall the replies on this topic were about (the need for) collaboration, but mostly not on experiences involving OER. Reasons why cooperation is considered important: it provides an

[32] See https://col.org/services/knowledge-management/aptus

opportunity to identify missing gaps; an opportunity to improve in the provision of skills programs responsive to the labor market.

TVET institutions (and maybe even education in general) need to operate in an ecosystem with the industry in order to effectively bridge the skills gap. Openness is therefore an essential attribute to operate an ecosystem successfully.

Several experiences are mentioned:

- Zambia, collaboration with industry over the years. The involvement/role of OER remains unclear in this experience.
- Nigeria: collaboration between TVET institutions or with industry to develop materials which attain OER status has just started. This gives a new consciousness which has to be understood first, and then nurtured for sustainability.
- The skills ecosystem designed by TAFE NSW ICVET Australia is a noteworthy example (dating from 2006!)[33]. However, no mentioning of the role of OER.
- Ghana: Collaboration between TVET and Industry. It is not clear if the role for OER mentioned is wishful thinking instead of realized practice.
- The Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant program of the American Federal Government, more specifically the repository SkillsCommons.org initiated in the program.

Topic 4: Learning from good practices

In our study we have come across several 'good practices' wherein OER or OER policies have been implemented, either by and in TVET institutions, or in a national TVET policy context, or in TVET.

We asked the participants: can you please describe briefly the project or program, in terms of targets and means? What has been accomplished? What (in your opinion) where the success factors that contributed to the accomplishment? What were the biggest barriers to overcome and how were these handled? Can you please indicate what the role of OER in the project or program has been?

Two of these practices have been presented in the webinar as mentioned earlier. There were no additional insights resulting from the discussion in the forum on this topic.

Topic 5: What do you expect from UNESCO-UNEVOC when introducing OER in TVET?

UNESCO-UNEVOC is involved in many activities to widen adoption of OER in TVET. In our study we have found activities such as:

- Awareness raising at policy level.
- Promoting the understanding and use of open licensing frameworks for educational, learning and training resources in TVET.
- Encouraging practices of development and adaption of OER in TVET, in different cultural contexts.

[33] http://lrrpublic.cli.det.nsw.edu.au/lrrSecure/Sites/Web/13289/ezine/year_2006/feb_apr/feature_ecosystem.htm

In our study we have recommended UNESCO-UNEVOC to expand its activities:

- Start systematically collecting good practices and, based on these good practices, formulate guidelines on how to come to policy formulation with regard to OER for TVET.
- Develop policy formulation models and frameworks that governments and institutions can use, modify and apply.
- Provide support on developing guidelines to customizing to local/national context.
- Provide support on systems for quality assurance of OER in TVET and for harmonizing existing quality systems.

We asked the participants: do you agree with our recommendations, do you want to supplement them or change them, and if so, which additions and modifications do you want to propose?

When this topic started, a poll was created to collect opinions on the proposed measures from the participants:

Which of these recommendations is in your opinion most important to follow-up by UNESCO-UNEVOC in order to support OER in and for TVET?

- Collect and disseminate promising practices related to OER in TVET
- Formulate guidelines for policy formulation with regard to OER for TVET
- Develop policy formulation models and frameworks that governments and institutions can use, modify and apply.
- Provide support for customizing / contextualizing OER
- Provide support for quality assurance of OER in TVET
- Assist in international harmonization of quality and accreditation systems
- Other:

When the conference ended on 20 November, 8 participants had replied to this poll. Five of them considered “Develop policy formulation models and frameworks that governments and institutions can use, modify and apply” as most important to follow-up by UNESCO-UNEVOC.

Other suggestions and comments in the discussion in the forum were:

- Raising awareness at the policy level is the right cause.
- Implementing policies, developed with help of UNESCO-UNEVOC, is a task of governments. The latter fails in some cases.
- Make available OER platforms with courses to create OER awareness
- Keep supporting projects until maturity, not only in the starting phase
- Support of research initiatives associated with OER integration in TVET at local levels
- Provide support in terms of assessment and evaluation of open content
- In formal educational programs, teach about OER and create awareness among students (as part of general skills development like digital literacy)