Chapter 7. Systematic Review of TVET Research[1]

This chapter focuses on research evidence regarding TVET in SSA. Instead of concentrating on the general research interests and goals of TVET, we now turn to the content of the studies (RQ6). We thus present a systematic review of the results in publications on TVET (RQ9, RQ10, RQ11). This chapter also discusses the research design and methodology of the U-publications under consideration (RQ6). We have included only those publications that are relevant in terms of the research mandate of this study (U-publications), and that are of high research quality (i.e., the U-publications). Later in the chapter, we present key challenges for TVET in SSA (RQ11), findings on TVET in relation to ICT (Section 7.4.), TVET education policy (Section 7.5.), and finally, suggestions that were made for TVET policy and further research (Section 7.6.; RQ9).

We note that it was not possible to synthesise all relevant research findings and research topics; the focus of themes for this chapter (and for Chapters 8 and 9) is based on the selection of research questions rather than frequencies drawn from the thematic analysis (Chapter 2).

Following on from the analysis in this chapter, Chapters 8 and 9 consider research that responds to key challenges for TVET: models for design, development and provision of TVET (Chapter 8, RQ7) and inclusion-related challenges and strategies (Chapter 9, RQ12).

Research questions considered in this chapter

The research questions considered in this chapter are listed in the box below.

Research questions considered in this chapter
RQ6. Research design and quality of results (in the publications considered).
[RQ6.a] What are the research designs in the publications considered? What are the research methods used?
[RQ6.b] What is the quality of reporting and the quality of results?

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RQ9. Findings and conclusions of publications considered. **[RQ9.a]** What are the main **findings** of the publication? **[RQ9.b]** What **recommendations for further research** are evidenced (in the publication: articles, web pages, policies)? **[RQ9.c]** What **recommendations for education policy** are evidenced (in the publication: articles, web pages, policies)?
[RQ10.] What do publications report about the **impact of TVET programmes** on participants and the wider society (impact/growth/sustainability/Sustainable Development Goals)?
[RQ11.] What are the **relevant infrastructural, technological, socio-cultural, economic and legal factors**? Which contextual (and regional) factors can increase or decrease the impact / growth / sustainability?
[RQ12.] What are the main **inclusion-related challenges** (equal treatment, e.g., gender, disability) in TVET in SSA? What are the successes and failures with respect to inclusion in TVET implementations?

Conclusions of this chapter

In this chapter, we present our system for the evaluation of the existing research literature, on the basis of which we systematically classified the research according to well-founded qualitative criteria on a scale from 'low' (l) to 'ultra high' (u).

Out of a total of 324 U-publications – publications that are relevant to our overall report – 162 were peer-reviewed. Of these 162 publications, only 14 (5%) were categorised as being of an especially high quality of research ('*u*') while 63 (just under 20%) were categorised as being of high quality (*'h'*). The remaining 75% were classified lower as '*m*' or '*l*'.

This chapter goes on to explore the research designs and methods drawn upon in the publications under consideration. We note significant research design limitations of both qualitative and quantitative studies, and methodological limitations concerning sampling and data collection. Shortcomings are also noteworthy in terms of structure, clarity of writing, referencing and analysis.

We then consider results from some studies that we consider to be particularly reliable. These studies made it possible to identify the key challenges for TVET training and research, namely: developing TVET institutions, promoting and increasing the number of TVET personnel, and improving the image of TVET. ICT is a recurring theme, and therefore a section of this chapter has been dedicated to the growing importance of ICT in Vocational Education and Training.

As we are considering reliable insights obtained from high-quality research, it is possible to make recommendations for TVET policy and TVET providers in SSA. Extensive government policy changes in the TVET system are occasionally recommended in the publications. These include: greater investment in TVET resources, stronger practice orientation,

intensification of teacher education and further education, the involvement of experts from outside (for example from companies), a greater focus on apprenticeship opportunities in the informal sector, and the promotion of ICT use in teaching and learning.

With regard to TVET providers, this report calls for a more intensive integration of ICT in teaching and learning provision and stresses the importance of qualified and experienced teaching staff.

Finally, this chapter deals with ideas and recommendations for conducting further TVET research. Firstly, we recommend relevant research that makes use of findings from related research areas. Secondly, we discuss the need for further research on existing studies to either deepen insights or to investigate the impact of changes made since the original studies.

As with the other chapters, the subsequent sections offer additional details of the points discussed in the summary above. Appendix 1.2 provides descriptions for the ultra-high-quality publications discussed in this chapter.

7.1. Design and methods in the U-publications (RQ6)

This section explores the methodology and quality of the publications that we assessed. It presents a summary of our criteria for the classification of publications as of either low, medium, high or ultra-high quality. After a brief overview of the publications that we considered, we present summaries of the structure, clarity of writing, referencing and types of research done in those publications. This section also details the types of analyses used in the publications, as well as their overall research design and the common methodological limitations of the publications that were considered.

7.1.1. Overview of publication quality

The process by which we assessed the quality of the publications is described in this report's research design (Chapter 2). For ease of reference, however, we briefly summarise the methodology we developed to structure the wealth of literature found, using well-founded criteria for quality assessment:

> ***u ('ultra-high')*** Indicates a well-referenced publication with good structure, appropriate methodology, a thorough analysis and a clear discussion of conclusive findings;
>
> ***h ('high)*** indicates a publication with a good structure and reasonable evidence-based conclusions; Methods are clearly described (for both primary or secondary research) and implemented (e.g., sample data is clearly specified), and the conclusions are derived from the data;
>
> ***m ('medium')*** indicates that the publication has a structure that compromises the clarity of the findings; Methods are clear (primary or secondary research), but the implementation or conclusions raise methodological issues;

l ('low') indicates a publication with a poor structure, which results in reasoning that is difficult to follow; they may be no obvious methods.

We note that as with the relevance setting 'u' is conceived as a subcategory of 'h' ('h' includes all of 'u'), Occasionally *'hm'* and *'ml'* are used for publications on the respective boundaries. As before, the relevance of the publications is classified using upper-case letters U / H / M / L as follows:

U ('ultra-high'): clearly satisfactory and selected for coding;

H ('high'): clearly satisfactory;

M ('medium'): unclear / contentious;

L ('low'): clearly unsatisfactory.

The symbols are then combined, e.g., '*U.u'* represents a publication with a relevance classification of 'U' and a quality classification of u. To improve legibility, abbreviations are superscripted and delineated with a slash (e.g., ↑U.u/Cameroon: Lange, 2014, with relevance '*U',* quality *'u'*). Only peer-reviewed publications were classified in terms of quality. As mentioned in the Introduction, exactly half (162) of the 324 U-publications were peer-reviewed. The other half (162) contains U-publications that are not peer-reviewed, including books, reports, dissertations or conceptual pieces. Such publications were not rated regarding quality, and are denoted with a '-' instead of a lower-case latter (e.g., '*U.*-' such as ↑U.-/Tanzania: Machumu, et al., 2016).

The quality rankings for the 162 peer-reviewed publications (all of ultra-high relevance) was as follows:

- Peer-reviewed publications with ultra-high relevance and ultra-high quality ('U.u', included in 'U.h'): 14;
- Peer-reviewed publications with ultra-high relevance and high quality, but not ultra-high quality ('U.h', not including 'U.u'): 63;
- Peer-reviewed publications with ultra-high relevance and medium quality ('U.m'): 46 (half of these were a high '*m',* i.e., 'U.mh');
- Peer-reviewed publications with ultra-high relevance and low quality ('U.l'): 39 (of which 22 were a high '*l',* i.e., 'U.lm').

The quality assessment conducted here corresponds to the aspect of 'rigour' within the UK Research Excellence Framework. However, the Framework contains two further components: 'significance' and 'originality'. While this chapter mainly draws on 'U.u' publications, we note that it felt insufficient to only draw on 'U.u' publications (i.e., quality as 'rigour'). Occasionally other 'U' publications ('U.h', 'U.m', 'U.l') offer valuable additional insights (with regard to 'significance' or 'originality'), and it felt warranted to include these.

Finally, remind the reader that this is the only chapter that indicates quality ratings in this way. This is because the focus of this chapter is about the quality and rigour of selected publications, and what this means for TVET practice. In other chapters, our

focus is on TVET research, where our quality of publications is only one aspect among many.

7.1.2. Research design and methods

Nearly two-thirds of the publications used qualitative methods. Among these are many works that examine documents (including government documents), policies, archival material or concepts by evaluating them using qualitative methods (mostly text and content analysis), such as the analysis of government documents by Alagaraja and Arthur-Mensah (↥U.mh/Ghana: Alagaraja & Arthur-Mensah, 2013), or the analysis of archival material by Atari and McKague (↥U.h/South Sudan: Atari & McKague, 2015).

The qualitative studies that collected primary data used methods common to social sciences such as interviews, focus groups and/or observations (e.g., semi-structured interviews; ↥U.h/Zimbabwe: Abas, 2014). These methods are used, for example, to record the opinions of TVET teachers, or to determine the impact of research projects on specific groups (for example: ↥U.h/Kenya: Appiagyei, et al., 2014).

About a sixth of the publications examined used quantitative methods. Among the quantitative studies collecting primary data, questionnaires were often used, such as a highly structured questionnaire on the training needs of nurses in South Africa (↥U.-/South Africa: Dulandas & Brysiewicz, 2018).

The remaining sixth used mixed methods. For example, Muganyizi and colleagues generated both quantitative and qualitative data to be analysed in their study (↥U.u/Muganyizi, et al., 2014:838). However, they did not explicitly describe their study as using 'mixed methods'. Such mixed-method approaches were also used by Appiagyei and colleagues in their investigation into pre-service nurse training (↥U.h/Kenya: Appiagyei, et al., 2014). This study analyses quantitative data from the Kenyan 'Regulatory Human Resources Information System' and the 'Kenya Health Workforce Information System' on student enrolment and job distribution. This data was used alongside

> *"qualitative data from key informant interviews with nurse training institution educators and/or administrators"* (↥U.h/Kenya: Appiagyei, et al., 2014:1).

Similarly, Mayaka and King used both an employee survey and semi-structured interviews

> *"to determine where current provision [in training within the tour-operating sector] is deficient and what is needed to address such deficiencies"* (↥U.h/Kenya: Mayaka & King, 2002:112).

Several purely qualitative studies validated their results by triangulating them with desk-based analysis using qualitative data from interviews and structured community reviews. For example, in a study on the position of the International Accreditation Organisation on informal education, researchers combined a survey (interviews) in 60 companies with an analysis of the available literature and archive materials on this topic (↥U.-/Zambia: Ryan, 2015).

Some researchers are developing proposals to apply new research methods in their respective fields. For example, Coker and Majuta emphasise the need to explore group counselling practice with culturally appropriate indigenous research methods (↑U.m/Botswana: Coker & Majuta, 2015).

7.1.3. Methodical limitations in the analysed publications

Issues that detracted from the quality of the papers often related to their methodology. Moreover, a number of publications do not attempt to consider the reliability of the studies, given the limitations of their methodology. In some studies, we noted flaws in the analysis (e.g., the failure to control important variables in the statistical analysis; ↑U.h/Kenya: Sambo, 2016).

Information about the type or method of analysis is sometimes missing or not presented clearly. Although many publications indicate the methods used for data collection e.g., structured interviews or questionnaires, they do not provide details of the methods used to analyse the data collected. Furthermore, relevant information is often missing, e.g., on how indicator scales and questionnaires were created, validated and piloted. In addition, causal claims, which cannot be justified by the methodology and analysis used, are sometimes made.

It is noteworthy that a number of mixed-method studies contain detailed methodological descriptions of one method used, but do not include similarly detailed descriptions of other methods used. For instance, at times the quantitative methodology and analysis are adequately described, but not the qualitative ones (or vice versa).

Methodological limitations are sometimes recognised by the authors themselves. For example, a comparison between two methods of ICT training for community health workers (CHWs) shows that

> *"no difference between blended and traditional learning in the acquisition of actual ICT knowledge by CHWs in rural areas in low- and middle-income settings"* (↑U.u/Malawi: Mastellos, et al., 2018).

However, the authors do note that the failure to identify significant results in this case is partly due to the specifications of the design of the randomized controlled trial (RCT), in which Mastellos and colleagues used only a small stratified sample (n = 40; ↑ibid.).

7.1.4. Sampling

Sampling methods were often at least partially reported. The most common information given about the sample tended to be where the sample came from (such as region or institution). The number of overall participants was also commonly reported. However, less frequently included in publications was a full description of the sampling method, i.e., how individuals or institutions were selected (e.g., purposively, randomly, convenience). Where sampling methods were reported, convenience and purposive sampling were common. In addition, the reasons for choosing a particular sample and sampling

method were often omitted. Examination of very small samples was not uncommon (↥U.u/Malawi: Mastellos, et al., 2018).

7.1.5. Data collection instruments

Our discussion of the methodological limitations of the studies ends with a brief consideration of the data collection instruments used. Publications often made note of the data collection method, for example, structured interviews or questionnaires. However, further details on exact interview questions, questionnaires or interview structure were often omitted. Relevant information, including how indicator scales and questionnaires were constructed, validated and piloted, were often omitted.

7.1.6. Structure and genre of the analysed publications

Most publications scored medium or high for the quality assessment based on their structure alone. In this respect, they meet the internationally recognised requirements for academic writing. This includes sections such as the introduction, literature review, methodology, findings, discussion and conclusion. However, some authors combined sections, with the result that the sections do not always correspond to the sections mentioned above. Nevertheless, the sections as such were easily discernible.

By contrast, research questions were not always clearly signposted, and were difficult to identify within some publications. Particularly for descriptive publications that primarily describe specific situations related to TVET and national contexts, as opposed to seeking answers for specific problems, research questions were often poorly articulated.

Examples of well-structured publications include the study by Lange and the study by Machumu and colleagues. Lange presents a well-structured quantitative study on the effect of professional development on teachers' attitudes towards teaching, and towards learning how to improve their teaching(↥U.u/Cameroon: Lange, 2014**).** Machumu and colleagues produced a well-structured qualitative study that explored blended learning in the TVET-system in Tanzania (↥U.u/Tanzania: Machumu, et al., 2016**)**.

A substantial minority of publications had no clear structure, or an atypical structure for a research publication. Such publications were predominantly discussion or opinion pieces, or publications that focused on document analysis and literature reviews.

7.1.7. Clarity of writing and typographic aspects

The writing style of the research contributions is usually appropriate. However, the text of some publications had easily noticeable deficiencies in the clarity and style of writing. These publications had typically been either translated from another language or written by non-native English speakers.

Other publications were written clearly but contained noticeable typographical errors. Typographical errors were more common in lower-quality publications.

7.1.8. Referencing

Most publications referenced at least a moderate number of sources. Even where citations are used in accordance with applicable rules, unfounded statements in studies are not isolated cases. Additionally, information on how and where literature was searched for was often not included.

Moreover, the scope of the literature search was occasionally found to be too narrow. The issue of searches being too narrow in scope is especially prevalent in desk-based research publications that reviewed existing literature.

7.1.9. Note on descriptive publications

Many publications were descriptive in nature. While descriptive research is certainly necessary, especially in under-researched contexts where most of the publications originate, their descriptive nature meant that they lacked in-depth analysis and discussion. However, it is acknowledged that it is difficult to conduct in-depth, rigorous research without the basic descriptive groundwork having been conducted first.

The description of detailed scenarios or problems is the primary scientific contribution made by many of these publications. However, they offered few empirical insights into why problems might exist within a certain context, or how such problems might be addressed.

7.2. Studies with reliable results (14 studies)

Having examined the design and methods of the high relevance and high quality publications in order to discuss the overall quality of the publications, this section now focuses on the results of the papers of ultra-high relevance and quality.

The 14 U.u publications classified as most reliable focus on the effects of TVET programmes or training measures. We briefly present some results as examples.

A study on TVET programmes for rice producers identifies the impact of these programmes (↕U.u/Uganda: Kijima, et al., 2012). The results suggested that the programmes *"had significant positive impacts on rice profits"*. The researchers therefore went on to consider the impact of these programmes on the teachers concerned, and on the rice yield itself.

The study with the most positive findings concerning the impact of TVET (high reliability), is based on a robust difference-in-differences model (to analyse a 5-year, household-level panel data set). It reported that following agricultural training, *"technologies diffused gradually from the key farmers and intermediate farmers to the ordinary farmers"* (↕U.u/Tanzania: Nakano, et al., 2018:13).[2] This ultimately led to a situation in which

> *"the paddy yield of the key farmers substantially increased from 3.1 tonnes per hectare to 5.3 tonnes per hectare, while that of the ordinary farmers was noticeably boosted from 2.6 tonnes per hectare to 3.7 tonnes per hectare"* (↕ibid.:13).

A study by Wolf found that supplemental pre-service teacher training in Ghana had a positive impact on teacher motivations, but this training produced *"no impacts on the student outcomes that were assessed"* (↥U.u/Ghana: Wolf, 2018:26). An older study examining the financial impact of apprenticeship in Ghana states that only self-employed workers really benefit from apprenticeship training (↥U.u/Ghana: Frazer & Frazer, 2006).

While only the 14 U.u publications are presented below, we note that these studies are well supported by insights in U.h publications. This contributes to external validity. For example, the following U.h-categorised Ndegwa study offers complementary results to the U.u publications by Frazer & Frazer (above). Although craftspeople trained under the Efficient Grain Storage Project (EGSP) can prove they have acquired new skills, a comparison of 58 trained craftspeople with 123 unskilled craftspeople indicates that despite the training, *" the income of employed craftsmen has not been significantly increased."* (↥U.h/Kenya: Ndegwa, 2015).

For the purposes of clarity, the 14 U.u publications are tabulated in the final section of this chapter.

Please note that the quality classification (H/M/L) for all U-releases can be viewed in our Zotero library.

7.3. Results of studies regarding key challenges of TVET (RQ11)

The reliable research results presented in the previous section must be considered in light of the diverse range of challenges facing TVET, which have also been identified in the literature. Inadequate equipment, under-qualified staff and even the poor image of TVET itself may have influenced findings on the impact, growth and sustainability of TVET programming. TVET often faces challenges (RQ11) whatever the prevailing national infrastructural, technological, socio-cultural, economic and legal factors. The analysis that follows considers the following key challenges:

1. TVET facilities (↥U.h/Uganda: Tukamushaba & Xiao, 2012);
2. TVET teachers / educators (↥U.-/Uganda: Bananuka, 2008);
3. Perception of TVET (↥U.h/Ghana: Ayentimi, et al., 2018).

7.3.1. TVET facilities

Many articles reported that TVET facilities were of substandard quality, or entirely absent. For hospitality and tourism courses, low-quality or dated equipment was often used. Industrial companies also complain of

> *"confusion for fresh graduates when they find new equipment in the industry that they have never used or operated before"* (↥U.h/Uganda: Tukamushaba & & Xiao, 2012:349).

Similarly, a review of agricultural TVET in Benin, Ethiopia, Namibia and Sierra Leone identified *"inadequate and outdated training materials and equipment"* (↥U.-/Namibia, Sierra Leone, Ethiopia, Benin: NEPAD, 2013:10).

Other articles found training facilities to be lacking entirely. For example, a study by ↕Salami, et al. (2016) reported an absence of teaching resources for a training programme for nurses in Nigeria, including nursing laboratory equipment, as well as of academic journals and medical technology.

Challenges relating to technological resources featured prominently in studies that focused on facilities. For example, the absence of video equipment was found to hinder a participatory action project concerning social work in Ghana (↕U.m/Ghana: Kreitzer, et al., 2009). Another study reported that a lack of computer access had obstructed distance-learning TVET projects (↕U.h/Tanzania: Nartker, 2010).

Lastly, the cost and speed of internet access have consistently hampered learning in almost all facilities. Interest in distance learning in Malawi, for example, has been inhibited by *"slow and expensive Internet access"* (↕M.-/Malawi: Mains, et al., 2011). Only 3.3% of the population had access to the internet when the study was published, and only 6.5% in 2016, the latest data available (↕Malawi Internet Users). Similarly, a review of distance learning programmes in Tanzania found that *"students' poor computer access… high cost and slow speed of internet access… and unreliable electricity coverage"* created obstacles to learning (↕U.h/Tanzania: Nartker & Stevens, 2010:7).

7.3.2. TVET teachers / educators

Studies also often reported on the problems posed by the absence or unprofessionalism of TVET staff. A common concern was the number of unqualified staff associated with these programmes. In their consideration of university courses in leisure, hospitality and tourism, Tukamushaba and Xiao noted that it was uncommon to find academic staff with relevant doctoral degrees (↕U.h/Tukamushaba & Xiao (Uganda: 2012). Similarly, a review of agricultural TVET found a *"lack of skilled and qualified trainers in training institutions"* (↕U.-/Namibia, Sierra Leone, Ethiopia, Benin: NEPAD, 2013:10). In Uganda, Bananuka and Katahoire found that trainers in the non-formal education sector possess a *"lack of specialised training"* (↕U.-/Uganda: Bananuka & Katahoire, 2008:ix). Indeed, these are often

> *"a cadre of volunteers and school leavers from [a] FE (formal education) system and lack the very basics of adult learning facilitation and ability to structure materials on a flexible-learner based approach"* (↕ibid.:22).

Ghana provides another example: social work lecturers who have been educated abroad but are practising in Ghana often lack awareness of the realities of practice:

> *"[those returning] from Europe, the US and Canada to teach were unaware of local issues in Ghana and posed examples from their experiences in the western world"* (↕U.m/Ghana: Kreitzer, et al., 2009:157).

In a similar vein, Hardman reported on the issues associated with seeking to adopt international best practices in teacher education, with these often ignoring the

"everyday realities of the classroom, and the motivations, capacity and cultural beliefs of the teachers charged with delivering such reforms" (↥U.h/Tanzania: Hardman, 2012:827).

In the SCR, Joy Papier (University of Western Cape, South Africa) mentioned that South Africa was far ahead in terms of policies of teacher development (because the country standardised teacher education). According to her, most countries in Africa are trying to standardise their qualifications.

7.3.3. Perceptions of TVET

The issue that we consider in this section is the poor public image of TVET. In Ghana, TVET is commonly understood to be *"a route for those who are not able to function within an academic setting"* (↥Ghana: U.lm/Boateng, 2012:112). Boateng asserts that negative public perceptions are reinforced by the *"lack of progression routes from vocational-technical education into higher education"* (↥ibid.). In the same national context, TVET is *"branded as a low-prestige career pathway"*, comprised of students who are unable to reach the academic level required for entrance to *"mainstream schools"* (↥U.h/Ghana: Ayentimi, et al., 2018). Additionally, Yangben and Seniwoliba found that

> *"most parents also deny their wards that have the passion for technical courses and rather prescribe technical education for their children who are academically weak"* (↥U.-/Ghana: Yangben & Seniwoliba, 2014:22).

Similarly, Bolarina states that to many in Nigeria, TVET *"was construed to mean education for the less privileged in society"*, and some believe it to be *"for the mentally retarded, physically handicapped and socially maladjusted students"* (↥U.h/Nigeria: Bolarina & Akinyele, 2018:4). Hence, the perception of TVET as a segment of education designed for dropouts or academically poor individuals is also predominant in Nigeria (↥U.lm/Nigeria: Ogbondah, & Wobi, 2014). According to Maigida and Sabato,

> *"modern society has conditioned the youth into believing that the only route to success is university education. This has compiled many youth to prefer university as the best place to acquire education. This is followed by Polytechnics and then Colleges of Education. Policymakers at the Ministry of Education (FME) reflect this belief in the manner of allocation of fund for tertiary education with a bias towards university education in ratio of 3:1"* (↥U.lm/Nigeria: Maigida & Saba, 2013:307).

Some articles do little to dispel the negative perceptions about TVET. For example, one study reported that the majority of prospective teachers participating in initial education possessed only *"the minimal qualifications necessary for entrance"*, with tutors also reporting that trainees' competence in both Kiswahili and English was limited (↥U.h/Tanzania: Hardman, et al., 2012).

To address this issue, ↥U.h/Latchem (2017:223) recommends convincing *"students, employers, communities and funding agencies that TVET is future-oriented"*. The author asserts that TVET needs to use the internet and social media to rebrand and reposition itself in the educational hierarchy, portray itself as innovative and customer-responsive,

increase its market share, internationalise its programmes, and develop strategically important partnerships.

There have also been other attempts to help change the poor perception of TVET. The African Union's Continental Education Strategy for Africa 2016–2025

> *"aims to bring a paradigm shift in TVET by developing the idea that TVET prepares youth to become more of job creators than job seekers so that the public discard the idea that TVET is a refuge for those who failed in general education"*(↟African Union, 2015:16).

Augustine and colleagues were commissioned to conduct a study (with TVET graduates who wanted to enter higher education via a bridging course) in this context. The study sought to *"establish formal, proper and correct progression pathways of TVET graduates for further studies"* (↟U.h/Tanzania: Augustine, et al., 2017:4). Students who had already attended a bridging course were asked about their willingness to continue their studies:

> *"100% of students recommended the bridging course continue because it is helpful regardless of constraints they are facing. Seventy one percent recommended the bridging course to continue because it is the only entry route that exists for them [to enter higher education institutions]"* (↟ibid.:7).

This research does not directly address the image problems of TVET in SSA. However, it confirms how helpful it is to make TVET pathways permeable, as well as the level of demand there is for doing so – not least in order to increase the attractiveness of TVET (↟ibid.).

7.4. Results of studies regarding TVET and ICT

As mentioned earlier in the report, many publications address the topic of ICT in relation to TVET, and we therefore devote this section to discussing this topic.

Within the findings concerning technology, various prominent sub-topics are identifiable. This review covers the following sub-topics: the level of ICT use, the methods of promoting ICT use, and the delivery of TVET through ICT-based programmes. For additional discussion on the role of ICT in TVET, see Chapter 6.

7.4.1. The level of ICT use

Understanding of current ICT use was among the objectives of multiple papers (e.g., ↟U.h/Rwanda: Harerimana, et al., 2016; ↟U.h/Nigeria: Olaniran, et al., 2016; ↟U.h/Ghana: Bonsu, et al., 2013). These studies presented findings on the impact of TVET on workers in a variety of settings. These included TVET lecturers, teachers and healthcare workers. A quantitative survey comprising part of a doctoral thesis by Agufana found that lecturers in Kenya's TVET colleges commonly used ICT on a daily basis for the purposes of instruction (with 40% of respondents doing so), and that ICT was perceived as having *"ease of use"* (↟U.-/Kenya: Agufana, 2015).

In Mozambique, however, a baseline study of the five TVET institutions participating in the National Directorate for Technical and Professional Education (DINET) project found that the three TVET colleges that offered distance education laboratories (described as *"well-resourced video-conference rooms"*) had only been seldom used (↑U.-/Mozambique: Romiszowski, 2015:3). All five institutions had a computer laboratory, but the quality of internet connectivity varied (↑ibid.). Similarly, Hashim and Abubakar found the ICT facilities at the five TVET institutions researched to be inadequate and the internet service weak and unreliable (↑U.mh/Nigeria: Hashim & Abubakar, 2017).

When investigating the use of e-learning resources by trainees prior to teacher training in Nigeria, Olaniran and colleagues noted that the *"majority of the respondents expressed dissatisfaction in respect of the pre-recorded video materials"* [3] (↑U.h/Nigeria: Olaniran, et al., 2016:234). Furthermore, the use of e-learning resources was impeded by poor internet connectivity and electricity problems (↑ibid.). In addition to poor internet connectivity, another problem faced by many in SSA is the cost of internet access which is not always free for the academics, administrative staff and students. For example, Minishi-Majanja and Ocholla, who researched library and information science education in Kenya, found that only 57% of the courses provided internet access for free (↑U.h/Kenya: Minishi-Majanja & Ocholla, 2003).

The level of ICT training received by health professionals, as well as the practical use of ICT, was also considered. Ajuwon and Rhine found internet access in work settings to be high among respondents (85%), but their use of ICT was largely the product of self-teaching: 61% had initially trained themselves in the use of ICT, and 70% had received no recent formal ICT training (↑U.h/South Africa, Kenya: Ajuwon & Rhine, 2008).

7.4.2. Methods for promoting ICT use

The publications are largely positive about the use of ICT in TVET programmes (see, for example, ↑U.h/Kenya, Rwanda: Agufana, 2018; ↑U.h/South Africa, Kenya: Ajuwon & Rhine, 2008), so it is therefore unsurprising that methods of promoting or increasing ICT use are also considered. For example, Hlophe and Mindebele (↑U.u/eSwatini, 2001:348) call for the provision of *"comprehensive ongoing professional development opportunities for school teachers, in particular, vocational teachers"*. In another example, Mastellos and colleagues conducted a randomized, controlled trial to test a blended learning method against a traditional learning method of ICT training delivery among health care workers (↑U.u/Malawi: Mastellos, et al., 2018). While both training methods led to significant increases in participant ICT knowledge, there was no significant difference between approaches. The authors, therefore, expressed a preference for blended learning because this *"combination of traditional face-to-face learning with other types of content delivery, often using digital media"* was more suitable for overcoming the resource constraints present in rural Malawi (↑ibid.:3).

3 However, a wide range of other resources was available to prospective teachers participating in distance learning.

Another method to develop capacity in the online use of educational media and technology was the Innovation in Vocational Education and Skills Training in Africa (INVEST Africa) programme. Established in 2010 by the Commonwealth of Learning (COL) in partnership with the Commonwealth Association of Polytechnics in Africa (CAPA), its aim was to help TVET institutions to install the technology and infrastructure, and to institutionalise the new online-based forms of development and delivery of education. Isaacs analysed the implementation of the programme in two colleges: one in Kenya and another in Zambia (↥U.u/Kenya; Zambia: Isaacs, 2017). The author concludes that both colleges benefited from

> *"training and supporting the early adopters of technology to become champions within the community, the use of cascading training to diffuse knowledge and skills, the strong will to win and lead shown by the institutional leaders and the support of the national governments"* (↥ibid.:151).

One of the main conclusions drawn from the book on using ICT and blended learning in TVET edited by ↥U.u/Latchem (2017) was that

> *"it requires the creation of a training ecosystem wherein all of the stakeholders in the internal and external organisational ecosystems agree, collaborate and share resources, information and services"* (↥ibid.:201).

The author stresses that the requirements necessary for successful ICT application in TVET education include the following:

- leadership;
- resource planning and costing;
- collaboration and networking;
- professional development;
- knowledge and skills in instructional design for adult learning, self-directed learning and experiential learning;
- selection of appropriate media (such as text, audio, images, animation, video, games, etc) and methods for delivering ICT-based courses and programmes;
- learner support;
- research and evaluation.

7.4.3. Examples of delivery of TVET through ICT-based programmes

ICT is itself the subject of training, and is often used to implement TVET programmes. One example of this is training based on 'Zoom' (video conference format 'video over IP [internet protocol]'). The videos produced by the video conferencing are perceived as follows:

> *"easy to use, helped everyone remain engaged with the project, and allowed for ongoing, timely, and relevant professional development"* (↑U.h/Burundi: Scanga, et al., 2018:3).[4]

In Ghana, too, video clips are used as a tool for training (here in agriculture; ↑U.mh/David & Asamoah, 2011:12). Findings demonstrated that

> *"the video viewing club is an effective [and] relatively low-cost interactive training method for providing low literacy populations with skills, information and knowledge on complex technical topics"* (↑ibid.: 38).

The study identified that farmers had improved their knowledge despite any apparent gains in yield size, which was partly attributed to the methodological approach selected (↑ibid.).

7.5. Recommendations regarding TVET policy

The second thematic area of results from the publications that we review in this chapter is TVET education policy. The information found in the coded articles relating to recommendations for education policy is broadly organised into two sections:

1. recommendations concerning TVET policy;
2. recommendations concerning TVET.

This review does not include the numerous policy suggestions that emerged in answers to other research questions. These include, for example, recommendations for a greater emphasis on practical skills. A more detailed discussion of what the U-publications noted about policy can be found in Chapters10 through 13.

7.5.1. Recommendations regarding TVET policy

Some of these recommendations have broad objectives. Iyengar and colleagues suggested that TVET courses should be preceded by a mandatory 100 days of basic literacy in response to Nigeria's low rate of adult literacy (↑U.-/Nigeria, Senegal, Mali, Guinea, Mauritania: Iyengar, et al., 2014:16). The authors justify this by noting that *"basic literacy could help in the skill development of any other vocational skill"* (↑ibid.). Iyengar, however, does not provide any explanation as to why this is the case, or how this broad change could be implemented (↑ibid.).

Amedorme and Fiagbe proposed a similarly ambitious policy change, suggesting that *"the government should build [at least 20] more technical institutes in the country"* (↑U.l/Ghana: Amedorme & Fiagbe, 2013:255). Amedorme and Fiagbe acknowledge the government's intention to build more community senior high schools, some of which could instead become TVET institutions (↑U.l/Ghana: Amedorme & Fiagbe, 2013). The authors also briefly employ review-based evidence to show the positive effect that this could ultimately have on employment.

4 This method of delivery warrants further exploration, given the occasional direct involvement of international personnel in training.

Recommendations for government policy included suggestions for both the creation of new policies and the amendment of existing ones. The latter is found in a study by Ryan, who advocates the revitalisation of the Apprenticeship Act 1965 in Zambia to support informal apprenticeships (particularly within the nation's capital, Lusaka). The Apprenticeship Act concerns *"the contractual obligations of formally registered companies and their apprentices"* (↥U.-/Zambia: Ryan, 2015:16). Despite the positive direction of a subsequent policy document, the TEVET (Technical Education, Vocational and Entrepreneurship Training) Policy 1996, Ryan stressed that the Apprenticeship Act itself should be reviewed (↥ibid.). Discussions were reportedly ongoing at the time of his report's publication. Ryan considers this a necessity due to the failure of the Apprenticeship Act to focus sufficiently on apprenticeship opportunities in the informal sector (↥ibid.).

Among the diverse suggestions for new policies, this review also notes the work of Kijima and colleagues, who suggest broader policy changes to enhance the impact of training (↥U.u/Uganda: Kijima, et al., 2012).

For example, they write that while further training for farmers is useful, they do not consider it sufficient. Vocational training policy must offer other support measures in addition to training, e.g., investment in technology for agricultural equipment that would complement training projects (the study focused on rice producers (↥U.u/Uganda: Kijima, et al., 2012:1616).

Similarly, an investigation into the requirements for construction craft skills found that government funding of worker training would be best supplemented by a sector-specific levy upon businesses (↥U.h/Zambia: Muya, et al., 2006).

Notably, Davis and colleagues, speaking on agricultural education and training, suggest that creating the right policy environment in SSA would require,

> *"among other things, developing courses on research and technology management and facilitating policy dialogue among different actors in the innovation system that put policy-makers into direct contact with researchers, research managers, private firms, and civil society"* (↥U.mh/Mozambique: Davis, et al., 2008).

Policy recommendations for ICT – a frequent theme throughout this review – also re-emerged in these studies, with Konayuma calling for the promotion of Open Education Resources (OERs) and wikis[5] in Zambia by government departments / authorities, including the Ministry of Science, Technology and TVET and the TVET Authority (↥U.h/Zambia: Konayuma, 2013).

7.5.2. Recommendations regarding TVET providers

When considering policy recommendations for TVET providers, the use of ICT and ICT training was again a common theme. Researchers advocated the use of technology by lecturers in TVET departments (↥U.h/Kenya: Agufana, 2015; ↥U.h/Kenya, Rwanda: Agufana, 2018). A recommendation was made by Hlophe and Mindebele for arts teachers in vocational schools to be provided with ICT training (↥U.u/eSwatini: Hlophe & Mindebele,

2001). Studies also suggested that those providing TVET should employ lecturers with a *"higher education qualification"*, who, according to Agafuna, *"would be more skilled and comfortable with ICT"* (↥U.h/Kenya: 2015).

Furthermore, the importance of qualifications among those delivering TVET was emphasised, even in the absence of ICT. Alade stated that a

> *"postgraduate diploma certificate in education should be a condition before higher technicians could be employed in technical education curriculum delivery"* (↥U.u/Nigeria: Alade, 2015:74).

Policy recommendations relating to the delivery of TVET initiatives also noted the importance of teachers' experience in the relevant industry. This is evidenced in the suggestion that experienced artisans should play a greater role in TVET education (↥ibid.).

7.6. Recommendations of the studies regarding further research

We now consider those U-publications which recommend further research. The level of specificity of these recommendations for further research differs, and we have grouped the studies accordingly:

1. publications that suggest further research on the general area being considered;
2. publications that advocate obtaining follow-up information on the specific intervention / event being considered;
3. publications that call for replication (or an expanded replication) of the study design employed.

7.6.1. Recommendations regarding research in cognate areas

Studies that involved a synthesis of the research commonly fell into this category because they identified research gaps across differing topics. One such study by Colley found there to be

> *"a huge shortage of peer-reviewed, published research on all aspect[s] of teacher education and training in The Gambia, Liberia, and Sierra Leone"* (↥U.-/Nigeria, Gambia, Ghana, Liberia, Sierra Leone: Colley, 2014:226).

Chiksanda also believes that there is a need for broader research to address existing gaps in research; in his field of research he has identified a lack of

> *"research towards a better understanding of pedagogical practices in technical education classrooms in sub-Saharan African countries"* (↥U.h/Malawi: Chiksanda , 2011:368).

Hoosen and Butcher highlight a lack of evidence on the effect of ICTs on the efficiency of TVET programmes, and therefore recommend further research (↥U.-/South Africa, Zambia, Namibia, Botswana: Hoosen & Butcher, 2017).

7.6.2. Recommendations for follow-up research

Other studies suggest further treatment of topics that are directly relevant to the study that has already been undertaken. Coker and Majuta, for example, proposed a number of topics beyond the scope of their initial investigation into group counselling in Botswana (↥U.m/Botswana: Coker & Majuta, 2015:114). Focusing on consultants born in Ghana and trained in the USA, they ask:

> *"what cultural transitions and adjustment do [participants] make in order to fit back into their native-born society, while at the same time attend[ing] to their professional identities as U.S. trained professional counsellors and educators?"* (↥U.m/Botswana: Coker & Majuta, 2015:114).

David and Asamoah also suggested additional research into a topic immediately connected to their investigation (↥U.mh/Ghana: David & Asamoah, 2011). Their study emphasised the need for more research into aspects of video-led TVET, focusing on

> *"the impact of participatory versus conventionally produced videos and the cost"*, and the *"effectiveness and scalability of video training relative to other face-to-face, interactive methods such as farmer field schools"* (↥U.mh/Ghana: David & Asamoah, 2011).

Occasional suggestions were made by researchers for exploring particular research methods in the context of the topic under discussion. Similarly, Coker and Majuta highlighted the need

> *"to explore culturally appropriate indigenous research methods"* for group counselling practice (↥U.m/Botswana: Coker & Majuta, 2015:114).

Studies also considered the need for research on corresponding interventions (within the same topic area). These included Mano and colleagues who, in their investigation of the impact of basic managerial training, noted the importance of subsequent investigation on advanced training in order

> *"to explore what factors help industrial clusters enter the quality improvement phase successfully"* (↥U.h/Ghana: Mano, et al., 2012:24).

7.6.2. Recommendations for replication studies

Many papers called for further investigation into the specific event or intervention under consideration. For example, research concerning the trauma team training programme in Tanzania recommended further evaluation in future years *"as the course becomes better established"*, in addition to consideration of the same intervention in rural areas (↥U.h/Belwal, et al., 2010:883). The aforementioned study by David and Asamoah also called for research on a larger scale to provide additional, more conclusive, information on the impact of a video club initiative (↥U.mh/Ghana: David & Asamoah, 2011). Lastly, a study concerning hospitality and tourism education suggested further, more extensive, research into the very issue under investigation, involving a greater number of universities (↥U.h/Uganda: Tukamushaba & Xiao, 2012).

Some authors were even more explicit in their recommendations for future research, and called for a replication of the research design they had applied. These included authors in Kenya, who called for the replication of their study on tourism education in the same context but with a larger sample, and suggested it could be extended to include additional tourism sectors (↥U.m/Kenya: Mayaka & Akama, 2007). Lange and Benavot also recommended additional research to *"replicate the presented results"* (↥U.-/Cameroon: Lange & Benavot, 2016:190).

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