ICTs for TVET

Report of the UNESCO-UNEVOC online conference

14–28 May, 2013

Moderated by Nik Kafka, Teach A Man To Fish

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Table of contents

Glossary of terms used in the report

Digital divide	Refers to the gap or imbalance that exists between those who have access to information technologies and those who do not
ICT	Information and Communication Technologies
MOOC	Massive Open Online Course, available freely online
Moodle	A virtual learning environment for hosting learning materials
Netiquette	The rules of etiquette that apply when communicating over computer networks, especially the Internet
OER	Open Educational Resources, available freely online
Podcast	A digital audio file or recording that can be downloaded to a portable media player or computer
Social capital	The network of social connections between individuals and entities that can be valuable as they promote social cooperation
Social network sites	Web-based social media services that allow people to create a profile and make connections among similar interest-groups, family, friends, classmates, customers, clients and similar.
TVET	Technical & Vocational Education and Training
VLE	Virtual learning environment – a web-based e-learning environment with teaching and learning materials and resources
Vodcast	A digital video file or recording that can be downloaded to a portable media player or computer

Foreword

Around the world, Information and Communication Technologies (ICT) enable the implementation of education and training, the provision of learning content, and communication between teachers and learners. For that purpose, ICT should be harnessed with the purpose of providing more widespread access to TVET. In 2008, UNESCO defined its vision for ICT in education: "A world without boundaries where technologies support education to build inclusive knowledge societies". Information and Communication Technologies (ICT) are fostered by UNESCO-UNEVOC by using its online services as a tool to communicate with the UNEVOC Network and facilitate knowledge exchange in the global TVET community.

To explore the role ICT plays in access to and quality of TVET, the UNESCO-UNEVOC International Centre for TVET organized a virtual conference on ICT and TVET from 14 to 28 May 2013. The 2-week discussion was moderated by Mr Nik Kafka, CEO and founder of Teach A Man To Fish, an international non-governmental organization supporting schools across the developing world, and attracted 247 participants from 77 countries across the globe. The discussion aimed at facilitating dialogue on the implications of the digital learning revolution for TVET around the world. UNEVOC e-Forum members and the wider TVET community were invited to share their experiences and promising practices in ICTs for TVET. The debate highlighted the importance of having a platform such as the e-Forum to facilitate global exchange, providing people the opportunity to gain inspiration from others, think positively and become action oriented.

Throughout the years, UNESCO-UNEVOC has continuously worked towards improving its online communication tools to enable TVET policy makers, researchers and practitioners from across the globe to access valuable information and communicate with each other. To facilitate knowledge exchange, in 2003 UNESCO-UNEVOC established the e-Forum, an online discussion board that has since become a global online community of almost 3000 TVET experts taking part in crucial discussions on TVET-related issues. To further promote focused debates on crucial themes in TVET, UNESCO-UNEVOC introduced the first moderator-driven e-Forum discussion in 2011. Through these discussions, UNESCO-UNEVOC aims to enhance awareness and encourage wider debate and understanding, including the sharing of on-going practices and the formulation of new ideas in the field of strategy and policy development. Guided by an expert in the field, the discussions seek experiences, expertise and feedback and wish to inspire people to take further action.

We would like to thank Mr Nik Kafka for sharing his expertise and commitment to the virtual conference. We furthermore extend our sincere gratitude to all participants who shared their experiences on the topic and contributed to the development of this report on ICTs for TVET.

Shyamal Majumdar
Head of UNESCO-UNEVOC International Centre

Introduction

Recent years have seen an explosion in the use of information and communications technologies (ICTs), which have come to play an increasingly important role in multiple aspects of our lives. We are observing an unprecedented expansion of the information available to all of us online and exist in an ever more interconnected world; however, this change has been so rapid and exponential that traditional models of education are only just starting to catch up and seek ways to best use these technologies for the benefit of learners.

From radio and video resources to Massive Open Online Courses (MOOCs), high-quality educational materials from across the world are being made available for free to many thousands of users, often for the first time. While it is early to tell exactly what impact these trends will have on TVET in the long term, it is clear that ICTs are an emerging force in TVET, with the potential to transform technical and vocational education. In a context of increasing global interconnectedness, new technologies allow for ever easier access to education and information, both at the national level and across borders. While access to learning resources used to be limited and restricted, increasingly more materials are now available for free, anytime and anywhere.

It is clear that Information and Communication Technologies (ICTs) are starting to have an important impact on education and training, and now need to be harnessed in a way that is favourable for the poorest in order to provide more widespread access to good quality Technical and Vocational Education and Training (TVET) for all.

It is against this background that the 2-week virtual conference was held, exploring the topic of 'The Implications of the ICT revolution for TVET'. Contributors to the debate shared their experiences, questions and case studies as we aimed to identify how ICTs can complement or replace traditional models of TVET.

The discussion was divided into 4 main topic areas, which we will summarize in the next section of the report:

1. ICTs as a tool: increasing the reach and impact of TVET through ICT

2. ICTs in the classroom: how can ICTs be used to improve learning outcomes?

3. ICTs as a goal of TVET: what are the ICTs skills needs in the workplace of tomorrow?

4. ICT challenges: the barriers, fears and risks of the wider use of ICTs in TVET

This report aims to summarize the findings of the conference in order to help provide information and directions for future research as well as programme work in this field. We hope that you find it useful.

1. Summary of discussions

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In this section, we will summarize the key points made in the discussions during the conference, based on the topic areas outlined in the introduction.

Topic 1 – ICTs as a tool: increasing the reach and impact of TVET through ICT

What role do ICTs play in making Technical and Vocational Education and Training available to more students? And what are the trade-offs between increasing access and improving quality?

The first issue explored during the virtual conference concerned ICTs as a tool for increasing access to TVET and boosting the effectiveness of vocational education. A large part of the debate centred on whether ICTs complement or replace a traditional classroom or centre-based approach. There was strong consensus around the position that ICTs do complement rather than replace the traditional teacher and classroom set up, and that the best means of integrating ICTs into TVET is via a flexible and blended approach. It was also considered that ICT tools and a blended approach make education more interactive and can increase students' motivation to learn. This means that teachers will continue to be key figures in supporting and directing students' learning and will be responsible for incorporating the use of technology into teaching.

Therefore, participants raised important concerns around teacher capabilities and preparation to respond to this new challenge in education. Knowledge and skills were mentioned as a key barrier; many teachers do not have the necessary I.T. or pedagogical skills to confidently integrate ICT and innovative methodologies into their teaching and will need support with this. Understanding and adapting to their new role as facilitators in a collaborative learning process rather than a more traditional 'lecturer' style of teaching is a difficulty facing many teachers across the world. Added to this, some contributors commented on problems such as students being more confident technology users than the teachers themselves. It was considered that all of these areas need attention through increased training and support for instructors, otherwise ICT projects for TVET will be unlikely to achieve the desired impacts.

Linked to these challenges is the necessary focus on instructional design and the use of appropriate media and technology for students in order to improve the impact, quality and effectiveness of education with ICTs. The appropriate form of ICTs will depend on the content to be communicated (i.e. some types of learning can make use of computer games or audio instructions, etc.), as well as the resources available to the TVET centre.

Following from this, a discussion proceeded about the use of video resources, how they can be challenging to produce yet can give fantastic results, boosting both the reach and quality of education, as exemplified by Cambodia and Connected Schools[1] and Commonwealth Of Learning's (COL) INVEST Africa programme in Ghana. INVEST Africa encourages partners to develop educational materials to share, especially videos, although instructors find it challenging due to constraints that they face. They report that video is time-consuming to produce and requires special skills and equipment. However,

1 Connected Schools is covered in more detail on pg 9 – WebEx Teleconference, and pg 11 on learning outcomes. For more information please also see pg 16 of the resources list.

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when videos are available, teachers find them extremely helpful. In one example from Ghana, a teacher with over 100 students in her food and beverage class produced videos for students to study prior to the practical element of the course. The content can now be covered in one day rather than several, showing how video can contribute to making teaching and learning more efficient and enjoyable.

Some contributors explored the benefits and drawbacks of mobiles and SMS for education, which is a key yet underdeveloped area given that the most widely used ICTs in developing counties are mobile phone and radio.

There were also a range of diverse points mentioned under topic 1; for instance, concerning how virtual classrooms can complement students' learning and enable

them to interact with other professionals and learners worldwide. In terms of access, we heard how ICTs can be used to engage learners on distance courses, and how it can enable TVET centres to attend to students from a wider geographic area or even internationally. Additionally, ICTs have great potential for helping instructors to remain up-to-date with the latest developments in their field.

Topic 2 – ICTs in the classroom: how can ICTs be used to improve learning outcomes?

Following on from the discussion about how ICTs can be used in the TVET classroom and towards improving reach and quality, a discussion was held about which types of technologies are available and how they can be best used in teaching and learning.

Regarding which technologies are available to teachers and instructors, a whole range of high- and low-tech ICTs were mentioned, including Virtual Learning Environments (or VLEs, such as Moodle), podcasts, MOOCs, tape recorders, mobile phones, radio and others. We heard about video and tape recordings being used to supplement teaching, as well as podcasts, blogs and vodcasts in other contexts. Teachers talked about using YouTube to illustrate points, while others mentioned sending out materials by email or issuing tablet devices to students to relieve over-stretched library facilities or textbook budgets.

One technology highlighted in particular was Open Educational Resources (OERs). It was noted that OERs accessible online can be very useful for educational centres, enabling them to access additional expertise, although a significant challenge lies in identifying suitable OERs and adapting them to suit local needs and curricula. Encouraging TVET teachers to develop and share their own materials offers the potential to provide significant advantages in this field.

With regards to how to use ICTs to improve learning outcomes, a very interesting idea

revolved around how technology can be used in project-based assignments to support the development of critical thinking and creativity. The idea behind this is that, when used appropriately, ICTs have the potential to empower students by turning them into active and independent learners who are able to take charge of their own education by choosing and using a range of resources. This becomes further important when considering lifelong learning and developing independent and autonomous learners capable of keeping their skills current once they leave TVET. Given that graduates may end up working in jobs that do not yet exist and will need to adapt to the rapidly changing jobs market of the 21st century, it seems that ICT for TVET may have a vital role to play in long-term employability.

Another related idea put forward was that in order to improve outcomes of TVET more generally, ICTs can contribute to increasing employability in basic ways, such as knowing how to write a CV and apply for jobs online, through to teaching more complex specific software packages such as Autocad for professional design purposes.

Participants also mentioned how young people are often very enthusiastic about technology, and explored this potential to motivate and excite learners. It was also pointed out that incorporating ICTs could raise the profile and status of Technical and Vocational Education and Training, as people may see it as more 'high-tech' and higher quality, whereas currently it is often seen as the route for non-successful students to take.

WebEx Teleconference on technology for TVET

As part of this topic, a WebEx discussion was organized about the technologies available for TVET, reflecting a new experiment for the virtual conference. Fortunately, the technology itself worked smoothly on the day and everyone was able to hear the presenters, view the presentations and participate actively in the debate. During

the session, participants were able to made use of some of the great features of WebEx such as application and screen sharing as well as typing and posting links in the chat bar alongside the spoken conversation – all of which are very useful features for educational use of teleconferencing.

During the session, Nik Kafka of Teach A Man To Fish gave a brief introduction and then Pascal Mabille of Connected Schools presented his organization. The NGO, operating in Cambodia, films the best quality TVET instructors in the country, explaining both the theory and the practical element of their courses, before taking these videos to remote villages. Connected Schools supports teacher training so that instructors learn to use the video resources combined with their own teaching. The NGO also provides the necessary equipment to show the videos such as a projector, laptop, internet (where possible) and sometimes a car battery to power the equipment in very remote areas.

Following the presentation, discussions evolved around the challenges faced, which largely related to training the teachers how to best use the technology and incorporate it into their pedagogy, as well as how to measure student improvement. There was also a wider conversation on including life skills and entrepreneurship within this type of education and that ideally teachers and students would eventually be able to create their own educational content.

Teach A Man To Fish shared the example of how they are working remotely with an organization in Afghanistan (People In Need) to conduct teacher training on entrepreneurship via email and video conferencing, as this way it is possible to engage in capacity building at a distance in places where it would not be possible for a small NGO to operate on the ground due to safety concerns. Internet connectivity is a limitation in this case, but the approach can be effective in some contexts.

The conversation concluded by covering how the development of ideas for ICTs in TVET could be better coordinated across different countries. The UNESCO-UNEVOC Promising Practises database was mentioned in this area and this is shared as a resource in the reading list.

Conclusions on Topic 2 - how can ICTs be used to improve learning outcomes?

Overall, the main outcome of the discussions on topic 2 was that the most appropriate ICT tools need to be chosen and used in each context – subject to their availability – to help schools achieve their specific learning objectives.

It was also emphasized that a focus on teacher training and support and incorporating ICTs into teaching practices was key to the success, thanks to examples from Connected Schools, COL's INVEST Africa programme and a UNESCO project in Bangkok, among others.

The UNESCO Bangkok project, "Facilitating Effective ICT-Pedagogy Integration" was successful in improving teachers' capacity to integrate ICT in their pedagogy and creating an environment for student-centred use of ICT. One of the critical best practices of this project was the 'pedagogy-first' approach that focused on building the capacity of teachers to improve their own teaching techniques and integrate I.T. into teaching. This was achieved using a project-based learning style and online collaboration with other educators to build confidence and ability, before teachers subsequently incorporated these learning outcomes into their own classrooms. Teachers needed guidance on how technologies could be used in the context of the curriculum and how to link all activities to clear learning objectives in order to ensure relevance for the students. The online collaboration with other teachers helped to provide ongoing professional support that further boosted their confidence to apply the methodologies learned.

As we heard during the WebEX teleconference, Connected Schools employs a similar approach,

whereby teachers are trained in how to use the technology, in this case video lessons for TVET. Training is offered on strategies for best use of the video resources, in combination with instructors' own teaching, and the videos are presented as part of a structured curriculum for ease of use. Additionally, teachers are trained in wider ICT skills and have scheduled video conference calls with more experienced teachers so that they can ask questions and receive further guidance.

The approach of COL's INVEST Africa project is to support institutional development within schools alongside teacher professional development as a way to support and manage change. The focus is on 4 areas: strategic, organizational structures, ICT management and teaching and learning – with training provided to teachers and managers to promote progress.

In all of these instances, the projects have been more successful than some other ICT initiatives precisely because the use of technology was linked to specific learning outcomes and implementation was well designed and supported by ongoing teacher training in order that instructors could use resources confidently and effectively.

The counter-example of interactive whiteboards was also provided, including how one project as part of the Sankore "Digital Education for All in Africa" initiative in Madagascar had limited success with the introduction of digital whiteboards. While they were initially popular, the rate of ownership and use of the whiteboards has been low and teachers have lost motivation. This seems to be due to a lack of teacher training and consideration of their workload, which links neatly to our point about the importance of instructors' skills and ongoing support to integrate ICTs into teaching practices, without which projects are unlikely to succeed.

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Topic 3 – ICTs as a goal of TVET: what are the ICTs skills needs in the workplace of tomorrow?

In the third topic for discussion, it was highlighted that gaining digital literacy and knowledge of the effective and creative use of ICTs has never been more important for students. It was noted that as a key skill for today's young people in the modern world – for learning, for life, and for work – ICTs should be seen as a learning goal in itself and not simply a medium for delivering educational content.

One issue cited by contributors was that as teaching and learning are becoming increasingly dynamic and changing more rapidly, ICTs need to be fully integrated into all parts of TVET to avoid being simply an "add-on". This overlaps somewhat with the comments in topic 2 regarding how ICT can contribute to lifelong employability as learners become more adaptable to changing circumstances; however, some further specific points proposed how this could be achieved.

It was suggested that the transferrable ICT skills that will enable learners to be successful in the world of work include communication,

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collaboration, problem solving and ideas creation, so these important life skills need to be encouraged and developed in all TVET centres. It was considered that students also have to be confident about learning via digital means (ICT literacy), as this provides an opportunity for them to continuously upgrade and update their skills once they have left formal education. Confident use of social networks can also provide opportunities for learning, collaboration and networking.

Other related issues mentioned were around 'netiquette' and the appropriate and safe use of technology by students, which should ideally be taught in all courses where the use of ICTs is encouraged, especially where students access material online. It is important for an educational institution to have a code of conduct for the use of ICT, to ensure that equipment is not misused and that students understand how to find and use appropriate, reliable and safe sources of information online.

All of this should contribute to innovation and a knowledge-based economy, as well as the development of social capital and more successful careers for learners after they leave education. Contributors were of the opinion that all of the above skills need to be taught in TVET programmes to ensure that students are prepared for the workplace.

Participants additionally expressed the hope that ICTs and TVET can contribute to job creation, employability and sustainable economic growth, provided that the 'digital divide' can be overcome to ensure that such growth is equitable and accessible to all.

A valuable point was also raised around joint knowledge creation online. The collaborative development of learning resources, or OERS, both by students and teachers, is another area to be encouraged, highlighting the potential of ICT for helping to develop and share TVET resources that are made by users for users, thus improving access to this type of education for all.

Topic 4 – ICT challenges: the barriers, fears and risks to wider use of ICTs in TVET

While exploring the ways in which ICTs can positively impact both access to and quality of TVET, we also examined the common challenges of incorporating ICTs in diverse educational settings. Our fourth main question centred on the issue of how increasing the use of ICTs in TVET entails facing up to a diverse range of potential problems – from costs to security risks and barriers to access – which could mean that some learners are excluded from the benefits. While recognizing that these barriers exist, the discussion focused on trying to find solutions and answers to these issues towards the aim of assisting forum participants with their own projects.

The lack of infrastructure, particularly electricity, computers and internet connectivity was mentioned as a common barrier, and several participants stated that it seems possible the 'I.T. lab' will become outdated as students increasingly access resources through phones and tablets. This could reduce the difficulty for schools in terms of buying and maintaining computer equipment, although it could also deepen inequalities between students if some have such devices while others do not.

While small scale solar installations can help off-grid communities and NGOs such as Computer Aid can donate refurbished computers, we should recognize that the initial costs of incorporating technology into teaching are often high for TVET centres. An interesting idea is to identify how equipment could be used to generate an income so that schools have the money to be able to fix and replace equipment when necessary.

Many areas do not have access to the internet, thus limiting access to online resources such as OERs, MOOCs, YouTube and other sources of educational materials. We received a few suggestions for overcoming issues with internet connectivity; for instance,

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sharing resources on USB memory sticks in rural areas, or sending smaller files that are easier to download on weaker connections. However, more work is needed on this issue.

Another interesting concern raised was how people who lack basic literacy as well as computer skills can use technology for learning, and additionally how they can use ICTs for learning about practical subjects. Learners as well as teachers have to feel comfortable with using technology and adopting a blended approach to educating, which can often require substantial further training for both groups. For those with limited literacy, it is important to address this issue first with teaching, as well as initially exploring the use of technologies that do not require literacy, such as radio and videos. There also needs to be more content available in local languages in order to make educational materials available to wider audiences and enable this to be integrated into curricula.

As mentioned in the other topic areas, teacher training and embedding technologies into learning, curricula and assessment are important challenges that need to be overcome with education policies and ongoing training. It is also a valuable idea to build ICT use into the wider community and involve siblings, parents and families so that they can become familiar with technology and see its worth.

Finally, and importantly, there is the concern that if these issues are not adequately addressed then the gap or 'digital divide' is likely to widen between those who have and

those who lack access to the educational benefits of ICTs, thus deepening existing inequalities and failing to promote equitable development. This is particularly important as younger generations are growing up in a primarily digital world and those without experience of technologies are at risk of being left behind. In order to avoid this scenario, pro-poor and pro-equality ICT approaches to education need to be developed and adopted. This issue is hugely complex and requires interventions at many different levels, but one suggestion that could help in this area is community access centres to promote ICT use and training among those who would otherwise be excluded. We would welcome more work and contributions on this area to ensure that ICTs for TVET contributes to reducing global inequalities.

Lessons learned

The conference provided a useful space for participants to explore many aspects of ICTs for Technical and Vocational Education and Training and share views and ideas. A very wide range of topics were covered, from teacher training to 21st century skills and from OERs to a lack of ICT access, all of which were informed by highly engaged participant input from a wide range of countries and professional backgrounds.

Overall, what remains clear is that technology has not changed the fundamentals of education – what is ultimately important is that schools are able to deliver a high quality education to students – and while technology has an important role to play in supplementing this, teachers are still very much central to successful learning outcomes.

Several points emerged from the comments and experience of the conference that were commonly agreed upon by the participants:

- Overall, there was broad agreement across the forum that ICTs could and should be incorporated into TVET, although they are unlikely to replace

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the teacher or traditional centre-based methods altogether, rather resulting in a flexible and blended approach.

- The main concern was that teachers are often not prepared to use ICTs in teaching and require additional training in how to incorporate technology for improved educational outcomes.

- Participants also cited the importance of the technology being appropriate for use in each context and being fully integrated into curriculum design, pedagogy, learning and assessment. ICT solutions rarely come 'ready-made', and it is vital to make the necessary adaptions in each situation.

- Contributors noted how the use of ICTs can improve the quality of education more generally; for instance, via project-based learning, which helps to develop critical thinking, problem-solving and creativity, so-called 'soft skills' that support lifelong learning.

- It is clear that a good knowledge of ICTs combined with the resulting development of soft and transferable skills, in addition to the technical training provided, stands to benefit all students and teachers in the constantly changing jobs marketplace of today, forming a

toolkit for long-term employability and success in the workforce.

- It was also suggested that the use of ICTs could improve both the quality and the perception and status of TVET, which is not currently held in high regard in many countries.

- Finally, it was stated that there is great potential for job creation and economic growth to emerge from improved TVET and a knowledge-based economy if the benefits can be extended to wider parts of the population.

Outlook and recommendations

We have seen that Information and Communications Technologies offer the potential to profoundly affect people's educational opportunities. However, it is also important to note that ICTs are at very differing stages of adoption and development in different countries, and while experiences are starting to converge in some cases, the differences between and within countries remain great.

Therefore, the international TVET community should be cautious about copying solutions from certain contexts and expecting them to work well in more resource-constrained environments. In order to achieve success, interventions need to be adapted to the local context and led by local needs and knowledge.

It is also vital that attention is focused on the emerging 'digital divide' and that policies are put in place to ensure that developments in technology do not end up deepening and exacerbating existing inequalities.

Therefore, our key recommendations are as follows:

1. Projects should be designed in conjunction with local participants and fully adapted to each context, including curriculum development and integration, materials in local languages, appropriate technologies and assessment methodologies.

2. In resource-constrained environments adding an element of income generation and entrepreneurship training could help to ensure not only the sustainability of the project and equipment in an educational centre but also a broader set of business skills for students.

3. Projects should invest in additional ongoing training and support for teachers and instructors, otherwise ICT projects for TVET will be unlikely to achieve their desired impacts. Training should cover both ICT and the latest teaching techniques in order to ensure that students gain the best technical, ICT and soft skills for their future careers.

4. Teachers and students should be encouraged to create and share materials online in order to boost the quality and range of educational resources available for TVET. These materials should be collected in a database and made available to all e-Forum participants for the benefit of all.

5. In order to reduce the digital divide, interventions should include basic literacy training and female participation to widen access to ICTs. Promoting TVET centres as community access centres for ICT could also broaden the use of technology to larger numbers of people who would otherwise be excluded.

Additionally, further research and comments on certain issues should be encouraged, including:

- How can ICTs be used in non-formal educational settings?

- Which technologies are the best for teaching practical vocational skills?

- How does TVET differ from traditional education in this regard?

- Further academic research on the impact and importance of ICTs in improving TVET outcomes

List of resources

Anumber of resources were offered as preparatory reading for the conference and several more were added by participants during the conference. Please find a list of resources below for your information.

Background reading

The following documents were provided before the conference as suggested background reading:

- UNESCO - Institute for Information Technologies in Education 'ICTs in TVET publications' *http://iite.unesco.org/publications/themes/tvet/*

- UNESCO Policy Brief – 'ICTs in TVET' *http://iite.unesco.org/pics/publications/en/files/3214697.pdf*

- World Bank – 'ICT and education' http://web.worldbank.org/WBSITE/ EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:20264888~menuPK:61 7610~pagePK:148956~piPK:216618~theSitePK:282386,00.html

- Saud et al. (2011) 'Effective integration of information and communication technologies (ICTs) in technical and vocational education and training (TVET) toward knowledge management in the changing world of work', African Journal of Business Management Vol. 5(16), pp. 6668-6673, 18 *http://www.academicjournals.org/ajbm/pdf/pdf2011/18Aug/Saud%20et%20al.pd*f

- The Humanitarian Centre (2011) 'Upgrading development: can technology alleviate poverty?' *http://www.humanitariancentre.org/wp-content/ uploads/2010/09/2011-International-Development-Report.pdf*

- Munyua, H. (2000) 'Information and Communication Technologies for rural development and food security: Lessons from field experiences in developing countries' *http://www.fao.org/sd/cddirect/CDre0055b.htm*

- Majumdar, S. A Frame Work Based on Functional Approach of ICT Usage *http://www.unevoc. unesco.org/fileadmin/up/a_frame_work_based_on_functional_approach_of_ict_usage.pdf*

- Majumdar, S. Modelling ICT Development in Education *http://www.unevoc.unesco.org/fileadmin/up/modelling_ict.pdf*

- Majumdar, S. Emerging Trends in ICT for Education & Training *http://www.unevoc.unesco.org/fileadmin/up/emergingtrendsinictforeducationandtraining.pdf*

Some example organizations and projects:

- UNESCO (2013) 'Connecting social entrepreneurship in ICT with educational purposes: The Cambodian case of Digital Divide Data' – *http://www.unescobkk.org/education/ict/ online-resources/databases/ict-in-education-database/item/article/connecting-social- entrepreneurship-in-ict-with-educational-purposes-the-cambodian-case-of-digital-d/*

- Morrow, K. (2002) 'Information villages; connecting rural communities in India' *http://www.bellanet.org/files/LEISA%20article_1.pdf*

- Islam, Md. Anwarul, and Hoq, Kazi Mostak Gausul, (2010) Community Internet Access in Rural Areas: A study on Community Information Centres in Bangladesh. Malaysian Journal of Library & Information Science, 15 (2) *http://ejum.fsktm.um.edu.my/article/947.pdf*

- Chigona, A., Chigona, W., Kayongo, P., & Kausa, M.(2010). An empirical survey on domestication of ICT in schools in disadvantaged communities in South Africa. 6(2) *http://tinyurl.com/domestication-of-ICT-in-school*

- RADCON – 'The Application of Information and Communication Technologies in Agricultural and Rural Development in Egypt' *http://tinyurl.com/domestication-of-ICT-in-school*

- Connected Schools – *http://www.connectedschools.org/* – creating a nationwide education network of vocational training courses via video lessons and video-conferencing in Cambodia

- Literacy Bridge – *http://www.literacybridge.org/talking-book/* – 'Talking Book' programme uses a low-cost audio computer designed for the learning needs of illiterate populations

- 'School in the cloud' idea by Sugata Mitra – *http://www.fastcoexist. com/1681483/ted-prize-winner-sugata-mitra-to-create-a-school-in-the-cloud* – self organised learning environment (SOLE) for children

Resources posted

The following resources were shared by participants during the conference:

UNESCO resources

- UNESCO 'Promising Practices' database – *http://www.unevoc.unesco. org/go.php?q=Resources+-+Promising+Practices* – Evidence of promising TVET policies for global dialogue and use

- UNESCO conceptual framework for assessing good TVET practices – *http:// www.unevoc.unesco.org/e-forum/PromisingPractices-ConceptualFramework. pdf* – part of the 'Promising Practices' database

- UNESCO Learning, Teaching and Training Materials (LTTMs) – *http://unesco-nigeriatve. org/download.html#header* – curricula and learning packages for TVET designed for West Africa on topics such as Accountancy, Technology, Hospitality Management etc.

- UNESCO campaign materials for skills development – *http://www.unevoc. unesco.org/go.php?q=Resources+-+Learning+and+Working* – films and documents available for various skills in French and English

ICTs for learning

- Educational interactive simulations for vocational training – *http:// recursostic.educacion.es/fprofesional/simuladores/web/simuladores/ fabricacionmecanica/fresadora/01_simulador/index_en.html* – from the Spanish National Institute of Educational Technology and Teacher Education

- ProActive, game-based learning – *http://www.ub.edu/euelearning/proactive/ joomla/index.php?lang=en* – European project on video games for education

- Technology Education Apps – *http://teachwithyouripad.wikispaces.com/ Technology+Education+Apps* – list of smartphone and ipad apps useful for education

Organizations and Projects

- Digital Education for All in Africa – *http://www. educationnumeriquepourtous.com/sankore/index.htm*

- COL – INVEST Africa – *http://www.col.org/progServ/programmes/ livelihoods/skillsDev/Pages/FlexibleSkillsAfrica.aspx*

Teacher training materials

- TESSA (Teacher Education in Sub-Saharan Africa) - *http://www.tessafrica.net/share* – open educational resources for teacher training and education in 4 languages

- Preparing Better Teachers for Tomorrow modules – *www.teacherprep.osu.edu* – Online teacher training modules

- Teaching with technology - *http://teaching.cet.uct.ac.za/* - tips and articles about technology for teaching from the University of Cape Town

- Teacher guides to technology in the classroom - *http://www.edudemic.com/guides/* - range of introductory guides for teachers on many different types of technology

Open Educational Resources (OERs)

- University of Cape Town resources - *http://opencontent.uct.ac.za/ - open* teaching and learning academic content from all faculties

- The National Institute of Open Schooling, India - *http://www.nios.ac.in/* - vocational, general and academic courses available online

- The People's University, India - *http://www.ignou.ac.in/* - open and distance learning modules for higher education

- Central Institution of Vocational Education - *http://www.psscive.nic.in:8080/* – courses materials available on automobile, IT, retail and security.

- Re:Source blog - *http://resource.blogs.scotcol.ac.uk/* - a wide selection of OERs to assist with learning and teaching

- Jorum - *http://www.jorum.ac.uk/* - find, create and share learning and teaching resources from the UK higher education community

- Khan Academy - *https://www.khanacademy.org/* - extensive free online video resources library for teaching (academic rather than vocational education)

- Coursera – *https://www.coursera.org/* - free online courses from 33 top world universities

- Online Courses - *http://www.onlinecourses.com/* - over 500 courses from top universities

- Connected Schools in Cambodia - *http://cambodia.connectedschools.org/en/professional-trainings.htm* - video trainings on vocational topics such as motorbike repair, electrician etc

- TESDA Online Program (TOP) Philippines - *http://www.e-tesda.gov.ph/* - free online courses in IT, Tourism, Electronics etc.

- Commonwealth of Learning (COL) - *http://www.col.org/RESOURCES/CRSMATERIALS/Pages/default.aspx* - large amount of open courseware and materials

- The Virtual Linguistics Campus – *http://linguistics.online.uni-marburg.de/* - large e-learning platform for linguistics

- Solarbotics - *http://www.solarbotics.net/bftgu/tutorials_mech_torque.html* - online physics tutorials

- Antonine Education – *http://www.antonine-education.co.uk/index.htm* - online physics and electronics courses for secondary level http://alison.com/

Additional background reading

- Blending Face-to-Face and Distance Learning Methods in Adult and Career-Technical Education - *http://calpro-online.org/ERIC/docs/pab00032.pdf*

- Facilitating Effective ICT-Pedagogy Integration Project – UNESCO Bangkok *http://www.unescobkk.org/education/ict/ict-in-education-projects/training-of-teachers/facilitating-ict-pedagogy/*

- Assessment & Teaching of 21st Century Skills - *http://atc21s.org/index.php/about/what-are-21st-century-skills/*
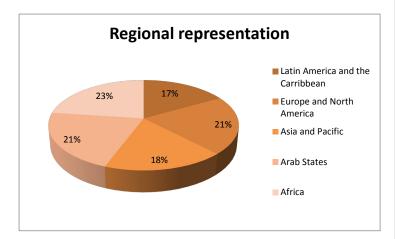
Participation

Overview

- Total number of participants : 247
- Total number of countries : 74
- Total number of messages : 168 messages

Regional representation

- Latin America and the Carribbean — 17%
- Europe and North America — 21%
- Asia and Pacific — 18%
- Arab States — 21%
- Africa — 23%

List of Participants

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About the Moderator

Nik Kafka is CEO & founder of Teach A Man To Fish, an international NGO supporting schools across the developing world to use enterprise initiatives as means of improving their financial sustainability and broadening access for the poorest children to a quality education. From a career in banking an interest in social change led him to Paraguay where he worked on a pioneering model for self-sufficient vocational schools; laying the basis to create Teach A Man To Fish. He is an active member of several boards as well the World Economic Forum's Young Global Leader community.

Co-author: Rachel Dale

This report was co-written by Rachel Dale, Programmes Development & Fundraising Manager at Teach A Man To Fish in London, United Kingdom. She has been with the organization since 2011 and spent much of that time based in Nicaragua, initially as a Project Officer at La Bastilla school, and then as Central America Programmes Coordinator. Rachel has extensive experience with business planning and small-business development as well as vocational education and training. She has conducted technical assistance, consultancy projects and training with a range of organizations in Nicaragua and Honduras.

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United Nations : International Centre
Educational, Scientific and : for Technical and Vocational
Cultural Organization : Education and Training