

ICT as a tool for knowledge transfer

Education for all remains very difficult to achieve in many countries, especially in remote areas in sub-Saharan Africa. Today modern ICT offers the most promising option to improve access to knowledge also in the remotest areas.

Information and Communication Technologies (ICTs) are indispensable to access the tremendous world of digital knowledge, whether online or offline. They enable the rapid generation, assimilation and dissemination of knowledge, and are thus one of the main drivers for social and economic development in the 21st century.

“eLearning” and “Web 2.0” are catchwords referring to the technology that allows internet users to develop individual arenas for networked learning, exchanging knowledge and working together on concepts and solutions. These open and collaborative models encourage self-help and self-reliance. The example of Wikipedia stands for new global information commons, stretching from information and media into culture and science. Social media – the venues of easy media publishing for all internet users – provide the opportunity for new forms of expression and creativity, and thus learning.

However, the state of internet connectivity in many educational and scientific institutions, especially in rural areas in Africa, is problematic. The 2006 World Bank Institute survey, “African Tertiary Institution Connectivity Survey”, described access to ICT infrastructure at African universities as

“too little, too expensive and poorly managed.” Especially for institutions in rural areas the situation is worse: Lack of access to international networks, lack of infrastructure to publish and disseminate locally relevant research, and the lack of affordable and relevant education materials hamper the development of local initiatives.

Although connectivity problems will be solved for most institutions in the long run, innovative solutions are urgently needed to provide as many opportunities as possible for people to access education and knowledge today.

The role of innovative technologies

The rapid pace of innovation in the ICT sector has considerably reduced the cost of ICT devices and ICT based

learning. This might lead to a “democratisation of ICT use” as a large number of projects and programmes are currently underway that focus on the use of low-cost ICT devices in rural areas. These include the “One Laptop Per Child Initiative” (OLPC), which has developed the “100 dollar laptop” (or XO laptop), Intel’s Classmate initiative, Acers EeePC, HP’s low-cost computer and others (for more information on low-cost computing devices and initiatives please refer to infoDev’s quick guide: <http://www.infodev.org/en/Publication.107.html>). One of the main goals of initiatives like these is to empower and educate children and young people through the use of technology and computer based learning.

In 2007 the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) has conducted a pilot test on the XO laptops in two Ethiopian schools and identified the following preconditions for a successful use of low-cost computing devices (<http://www2.gtz.de/dokumente/bib/gtz2008-0068en-laptop.pdf>):

- All or most of the local textbooks must be made available in a digital format.

Digital skills need to be integrated more effectively into education.

Peter Rave

Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
Eschborn, Germany
Peter.Rave@gtz.de



Photo: BilderBox.com

- Alternative update opportunities must be made available in areas with no or low internet penetration. For example “Open Toaster” (see Box “Open Toaster”).
- Security measures must be in place to prevent any misuse of devices.
- A teacher training programme must be in place to offer basic knowledge about computer technology and handling. The use of interactive books and authoring tools for developing tests or worksheets must be mastered as well as handling network communication.
- Do not invent too many innovations at once. For example, focus on delivery of digital textbooks first; then focus on computer and media literacy etc.
- Do not forget to calculate costs for distribution, installation and maintenance of the related technology as well as for training of teachers and administration of necessary assessment procedures.

Giving computers to students can be a very costly approach; therefore GTZ tested also alternative solutions to provide access to digital content in low-/no-bandwidth areas. Within the Engineering Capacity Building Program (ecbp), a reform programme aimed at accelerating industrial development in Ethiopia, GTZ on behalf of the Federal Ministry for Economic Cooperation and Development (BMZ) is supporting the development of Ethiopian universities. In this respect innovative ICTs are used to improve access to educational resources (see Box “Open Toaster”).

The role of open educational resources

ICTs form the backbone for collaborative research and (knowledge) production and for electronic publication and distribution.

It is therefore a development concern to foster the production and dissemination of local innovations, learning materials and scientific work. Equipping rural

“Open Toaster” within the Engineering Capacity Building Program (ecbp)

With support of GTZ students at the Faculty of Technology in Addis Ababa constructed an “Open Toaster” that is capable of distributing Free and Open Source Software (FOSS) and all kinds of Educational Resources. Students and the general public are allowed to bring along blank CDs and burn different software or educational content for free. Using the information shown on the touch screen, students can update and download content in a matter of minutes. The idea for the “Open Toaster” was derived from the South African “Freedom Toaster” project (<http://www.freedomtoaster.org>). Three Open Toasters, produced in Ethiopia, have been placed in different locations at the Faculty of Technology campuses in Addis Ababa. Additional Toasters are now planned for implementation at other, more rural Universities in Ethiopia.



An open education project at the University of the Western Cape

On behalf of BMZ the „Centrum für internationale Migration und Entwicklung“ (CIM), GTZ helped establish the Free/Open Courseware (F/OCW) project at the University of the Western Cape (UWC) as the first of its kind in Africa (<http://freecourseware.uwc.ac.za/ripmixlearners/>). The University of the Western Cape has a rich history and played a particularly important role during the struggle for democracy. It continues to act as an important provider of education and producer of knowledge that is relevant to the communities in post-apartheid South Africa today. The F/OCW project identified three subject areas of particular relevance to the South African knowledge society in which UWC had unique expertise: public health, constitutional law, and conservation biology. It worked with university management, academic staff and the eLearning division to increase understanding of legal issues connected with the use and publication of educational resources and to make the case for publication of Open Educational Resources as a way to increase visibility for the institution, and to share knowledge that is relevant to the country's development. Subsequently, the project supported faculty members in preparing their materials for publication, clarifying copyright issues and concerns and setting up a web server to host the materials. The project has also established links between UWC and international open education communities, such as the UNESCO OER forum, the Cape Town Open Education Declaration workshop and the Open Courseware Consortium.

schools with learning materials is just as important as supporting local businesses, researchers and higher education institutions in publishing their work and joining international networks. New approaches such as Open Access (OA) to scientific knowledge and Open Educational Resources (OER), such as textbooks and course materials, provide opportunities to overcome these difficulties by creating easier means for developing countries to publish and dis-

tribute local innovations and research. However, further empirical studies are needed to show the actual usage and long-term impact of Open Access and Open Educational Resources for developing countries.

Broadly defined, the term “Open Access” refers to free access to knowledge, by making peer-reviewed research journals available for learning purposes. Depending on the licensing model, Open Access content and

Open Educational Resources can be produced in collaboration and are usually published free of charge for users to download, use and share.

By sharing high-quality course materials, more institutions are empowered to offer instruction to address the need for education. In addition, by collaborating on the production of course materials, universities can share the effort, split the cost and increase the quality of educational resources. Creating open access to scientific materials can be achieved by publishing locally produced knowledge through electronic journals, publishing in institutional repositories and joining international networks free of charge for teachers and learners.

The role of capacity development

Achieving sustainable results in ICT based learning projects depend not mainly on the infrastructural conditions but on developing capacities at all levels and on embedding all activities in a coordinated strategy. The use of ICT can pose new challenges in terms of the design of teaching and learning frameworks. It requires teachers to adapt to new roles as moderators and advisors in the learning process.

To be able to make use of the opportunities offered by ICT based learning, individuals need more than just basic literacy skills; they also need to be dig-

The Health Exchange Forum in Tanzania

The Tanzanian German Programme to Support Health (TGPSH), for example, combines applied research, cooperation with local and German universities and ICT components (eLearning) in the interest of sustainable health sector development in Tanzania.

The programme has established 21 health information centres in Tanga and has implemented a Health Exchange Forum to facilitate communication and to enhance the flow and exchange of information between health workers in the districts. More than 25,000 users have registered on the site since 2004, benefiting from reliable, up-to-date health information. In addition, a very popular website offers information on sexual and reproductive health, HIV/AIDS and entertainment. (Information on Electronic Health Materials in Tanzania: <http://www.tgpsh.or.tz/human-resources-for-health/electronic-health-materials-for-various-target-groups.html>)

itally literate (ICT, media and information literacy). These digital skills need to be integrated more effectively into primary and secondary education and into higher education, vocational training and lifelong learning settings.

Most of our ICT based learning projects have shown a verifiable impact in accordance with the principle of subsidiarity: At all levels of intervention (policy, institutions and students), the users of networked learning projects enhance their skills in adopting knowledge, networking, team working, generating new knowledge and problem solving. One example for this is the Health Exchange Forum in Tanzania (see Box).

Conclusion

As long as reliable internet connections are out of reach of most rural

areas in our partner countries, innovations such as the Open Toaster and the XO laptop are good alternatives for knowledge transfer. In conjunction with new publication models such as Open Access and Open Educational Resources, students, institutions and businesses can easily access and produce digital content. However, to make an efficient, effective and sustainable use of those digital opportunities, capacity development remains the key step. Teaching practices must be upgraded towards activity-centred teaching and digital skills must be trained within different learning settings.

The author wants to thank the following contributors to this article: Jan-Philipp Schmid, Geraldine de Bastion, Thomas Rolf, Christian Kreutz.

Zusammenfassung

Die aussichtsreichste Option, den Zugang zu Wissen zu verbessern, ist heutzutage auch in entlegenen ländlichen Regionen der Einsatz moderner IKT. Innovative Ansätze wie *Open Toaster* und *XO Laptop* bieten gute Alternativen zum Wissenstransfer, solange keine verlässlichen Internetverbindungen in den meisten ländlichen Regionen unserer Partnerländer zur Verfügung stehen. Mit den neuen Publikationsformen wie *Open Access* sowie *Open Educational Resources* können Studenten, Institutionen und Betriebe leicht digitale Inhalte aufrufen und erstellen. Der Schlüssel zur effektiven und nachhaltigen Nutzung

dieser digitalen Möglichkeiten bleibt die Qualifizierung. Unterrichtspraktiken zur Einführung von aktivitätsorientierten Lehrfähigkeiten müssen verbessert und digitale Fachkenntnisse für unterschiedliche Lernsituationen eingeübt werden.

Resumen

Hoy en día, las TIC modernas ofrecen la opción más prometedora para mejorar el acceso al conocimiento, incluso en las áreas rurales más remotas. Mientras que la mayoría de las áreas rurales en nuestros países contraparte no cuenta con acceso confiable a Internet, las innovaciones tales como el *Open Toaster*

y las *laptops XO* son buenas alternativas para la transferencia de conocimientos. Con la ayuda de nuevos modelos de publicación tales como el Acceso Abierto y los Recursos Educativos Abiertos, los estudiantes, las instituciones y los negocios pueden acceder a contenidos digitales y producirlos con facilidad. Sin embargo, a fin de hacer un uso eficaz y sostenible de estas oportunidades digitales, el desarrollo de capacidades sigue siendo un paso esencial. Las prácticas docentes deben perfeccionarse para incorporar la enseñanza centrada en actividades, y es necesario asegurar la adquisición de destrezas digitales en diferentes entornos de aprendizaje.