Policies and Practices in Leveraging Low-Cost Computing Devices (LCCDs) for Education

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Just a few years ago, the use of low-cost computing devices (LCCDs) in the classroom was limited to desktop and laptop computers. Now, there is emerging interest in how tablets, e-readers, smartphones and feature phones can be used in educational settings. Such mobile devices are often less expensive and more portable than more traditional computers, and they are expected to play an important role in expanding access to information and communication technologies (ICTs) among both students and educators. This module incorporates recent and ongoing developments in the use of such devices to enhance educational initiatives.

Mobile creates new opportunities

The cost of computers has influenced national strategies for introducing information technology in schools. The typical way to reduce expenses has been to install a "computer lab" -- a shared location in the school where a few computers can serve multiple students. The growing ubiquity of mobile devices, however, creates new opportunities to change how students are educated, as well as the relationships between student and teacher and between student and content. Mobile devices can provide a level of reach, scope and immediacy that is largely unattainable through traditional classroom environments. The most up-to-date content can be accessible immediately -- from anywhere -- and it can be repeatedly reviewed for better comprehension and understanding. The typical mobile learning (m-learning) student saves 86.7 per cent of the money spent for a student taking the same training through a traditional classroom.[1]

Mobile devices and associated training can also be used to develop the human capital of teachers. There is a global shortage of teachers, primarily in areas with high poverty rates.[2] In addition, many teachers around the world are unqualified or underprepared to meet the educational demands of the 21st century.[3] Mobile devices can facilitate faculty mentoring and participation in online professional communities, making it easier for teachers to share best practices within their schools and with counterparts at other institutions.[4]

New kinds of mobile devices

As tablet computers have entered the mainstream technology marketplace (primarily in developed countries), they are increasingly included in discussions of LCCDs, alongside

[1] Dr. David Ngaruiya. Kenyan Faculty member of NIST, in an interview with David Rogers, University of Central Florida.
[2] UNESCO, "Mobile Learning for Teachers: Global Themes," (2012), available at http://www.meducationalliance.org/sites/default/files/mobile_learning_for_teachers_global_themes_2012.pdf.
[3] *Ibid.*
[4] *Ibid.*

smartphones. Apple's iPad may be the most well-known mainstream tablet, but several devices have been released at various price points, including some tailored specifically for the educational market and for developing countries. In addition, e-readers, such as Amazon's Kindle, offer an opportunity to make various types of content available to students, while also serving as literacy-improvement tools. E-readers have been used in several pilot projects.

Examples of low-cost tablets and e-readers include:

- xo-3 – One Laptop Per Child's (OLPC's) follow-up to the xo-1 is the planned xo-3 tablet computer. Working prototypes were unveiled in January 2012, and the company expected to begin shipping xo-3 tablets that year for a price below USD 100. The xo-3 can run either OLPC's Sugar operating system or Android.

- Studybook – Intel followed up its Classmate laptop with the Studybook tablet design.[5] As a reference design, Studybook will not be manufactured or sold by Intel, but the design will be licensed at no cost to any company interested in producing the device. Intel believes Studybooks can be produced at a cost of less than USD 200 each.

- I-slate – This tablet was developed by the I-slate Consortium. The I-slate is billed as a "low-cost learning tool designed for classrooms with no electricity and too few teachers."[6]

- Aakash/Ubislate – The Indian government spearheaded a project to develop a computer specifically for college students. Initially envisioned as a laptop, the Aakash evolved into a tablet computer running the Android operating system. A commercial version intended for wider distribution was known as the UbiSlate 7 and priced at approximately USD 50.

- Kindle – First introduced in 2007, Amazon's Kindle family of e-readers comprises models with either an e-ink or LCD display, with options for Wi-Fi or mobile network connectivity. The e-ink models run on a purpose-built operating system, while the LCD models use a modified version of the Android operating system.

- iPod Touch – Introduced in September 2007, the iPod Touch looks like many smartphones. It runs the iOS operating system that is shared by the iPhone and the iPad. In general, it has most of the functionality of an iPhone with Wi-Fi connectivity, but without mobile network connectivity and associated communication applications.

Pilot projects

There have been several pilot projects to incorporate mobile handsets into classroom learning environments. Such projects have focused on engaging students with their current lessons, as well as activities like conducting student assessments.

[5] http://www.intel.com/content/www/us/en/intel-learning-series/studybook.html.
[6] "Indian district plans to adopt 50,000 I-slate tablets," (March 19, 2012), available at http://www.vidal.org.in/sites/default/files/jb-ISLATE-March19-Full-Press-Release.pdf.

One such project is called Seeds of Empowerment. An outgrowth of a research project at Stanford University in the United States, it aims to increase access to basic education for children living in extremely marginalized communities around the world.[7] Seeds of Empowerment projects were launched in 2008 in Argentina, Mexico, and El Salvador, and additional projects were anticipated in Bolivia, Brazil and Uruguay in 2012.

In 2011, Paraguay's Ministry of Education launched the Learning Assessment through Mobile Phones pilot project to explore how to administer standardized tests through mobile phones.[8] The project, which focused on mathematics and Spanish language and literature, also included training for teachers and school directors to help students prepare and to provide them with technical support.

Worldreader, a non-governmental organization (NGO) best known for its distribution of e-readers to improve literacy in Sub-Saharan Africa, also offers an application for feature phones and smartphones that provides access to public domain books, as well as contemporary fiction and non-fiction.[9] Yoza Cellphone Stories is a project to support reading and writing by South Africa's youth by making a variety of reading material available over mobile phones.[10] The literature available over Yoza – including mobile novels ("m-novels"), Shakespeare plays, and poetry – resulted in 300,000 reads over its first year, as well as generating 40,000 comments in social media.[11]

Challenges to mobile learning initiatives

There are several challenges and obstacles to mobile learning initiatives:

- Currently, most of the projects testing m-learning are either small-scale pilots or isolated initiatives not built with scale and sustainability in mind.[12]
- Many projects are informal or have not been formally studied or researched, making it difficult to understand the "big picture" of m-learning initiatives globally.[13]
- M-learning does not eliminate the need for face-to-face training for teachers and other educators.[14]
- Although mobile devices offer access to new resources and teaching or learning methods, they remain only one of many tools available to educators and policymakers. Professional development should show teachers how to integrate mobile technologies with other tools.[15]

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[7] UNESCO, "Turning on Mobile Learning in Latin America," (2012), at 23, available at http://unesdoc.unesco.org/images/0021/002160/216080E.pdf.
[8] *Op cit*, 21.
[9] Worldreader, "Our Book App," available at http://www.worldreader.org/what-we-do/our-app/.
[10] See http://www.yoza.mobi.
[11] Yoza Project, "Yoza Cellphone Stories: Quick Overview," (August 2011), available at http://m4lit.files.wordpress.com/2012/05/3_yoza-cellphone-stories_082010_to_082011.pdf.
[12] *Op cit*, at 9.
[13] UNESCO, "Mobile Learning Week Report," (December 12-16, 2011), at 15, available at http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/ED/ICT/pdf/UNESCO%20MLW%20report%20final%2019jan.pdf.
[14] *Ibid.*
[15] *Ibid.*

- Due to the dynamic nature of the mobile landscape, it is challenging to integrate mobile technologies into educational practices in a timely fashion.[16]
- There is a lack of content development.[17]
- Cost information is not made public in some cases. LCCD pricing information is also sometimes speculative as projects move from concept to production and deployment.

Apps for LCCDs

Applications specifically intended for LCCDs continue to proliferate. The OLPC xo-1 runs a Linux-based operating system called Sugar that was initially developed for OLPC products. Sugar has since been made available for other devices, including those running Windows, MacOS and Linux.[18] Programs that can be used in the Sugar platform currently number nearly 450, including content related to math and science, media creation, games, maps and geography, search and discovery, games and teacher tools, among others.[19] Smartphones and tablets running widely adopted operating systems, such as Android or iOS, have increasingly been considered or deployed as LCCDs in educational settings. Such devices can take advantage of a variety of applications – both free and paid – that provide educational content or utility.

Moreover, as smartphones and tablets have proliferated, there has been increasing development of software intended to assist those with disabilities. Such software is not necessarily targeted at the academic sector, and it may even be included as a core operating system feature. For example, smartphones running current versions of iOS or Android have voice recognition and text-to-speech capabilities, which can be enhanced by third-party applications.

Conclusion

ITU members can take several steps to consider the potential benefits of mobile devices for their own educational programs and policies:

- Review existing education (including e-education) policies, programmes and plans to determine if they should be modified to reflect the rise of mobile devices and services suitable for education;
- Consult with education, ICT, and other stakeholders to identify potential areas of agreement, cooperation and potential improvement for m-learning initiatives;
- Identify the potential benefits and drawbacks to promoting m-learning initiatives;
- Consider making any relevant revisions needed to create an enabling environment for mobile education tools;
- Identify potential funding options for m-learning initiatives and pilot projects; and
- Incorporate mobile devices and m-learning initiatives into education policies and plans in an appropriate manner, and with adequate mechanisms for monitoring their effects.

[16] *Op cit*, at 11.
[17] *Op cit*, at 12.
[18] See http://sugarlabs.org/.
[19] See http://activities.sugarlabs.org.