Tablets & MOOCs, Digital Textbooks & Matthew Effects:

What's new (and what isn't) in technology use in education in developing countries

Excerpts from the World Bank’s EduTech blog (Volume V)

Michael Trucano
The World Bank
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2013 marked the fifth year of the World Bank's EduTech blog, which has been dedicated to "exploring issues related to the use of information and communications technologies (ICTs) to benefit education in developing countries". The posts in 2013 spanned a rather eclectic set of topics and issues, from MOOCs to mobile phones to Matthew Effects (and those are just the 'M's!). Viewed collectively, it is hoped that these posts provide a little insight into the variety of discussions and activities in which the World Bank has been engaged over the past year, assisting policymakers and practitioners in middle and low income countries as they investigate how new technologies can help education systems tackle long-standing challenges in new (and sometimes not-so-new) ways.

As in past years, in 2013 the EduTech blog served various purposes, but has remained at its core driven by a belief that by 'thinking aloud in public', we can try (in an admittedly very modest way) to use the blog to open up conversations about various themes to wider audiences, and to share emerging thinking and discussions on topics that in the past were often (regrettably) shared only 'behind closed doors' within small circles of people and institutions. There were fewer (27) posts over the course of the year, but many of them were much longer (some may argue that many of them were in fact too long, and indeed a number of them served as first drafts of sorts for upcoming papers and book chapters).

Before presenting this year's 'top ten' list, some quick boilerplate reminders: Posts on the EduTech blog are not meant to be exhaustive in their consideration of a given topic, but rather to point to interesting developments and pose some related questions. They should not be mistaken for peer-reviewed research or World Bank policy papers. The views expressed on the EduTech blog are those of the author(s) alone, and not those of the World Bank.

For those interested in such things:
- More background and context on the World Bank's EduTech blog
- A list of the top EduTech blog posts of all time can be found on this page
Top World Bank EduTech Blog Posts of 2013

10. A new wave of educational efforts across Africa exploring the use of ICTs + Citizens’ Monitoring of the Education Sector in the Philippines
There are a *lot* of innovative usage models and approaches emerging as a result of the application of information and communication technologies in places and circumstances for which they (until recently, perhaps) have not really been explicitly designed. These two posts provide quick peaks into some of these sorts of models and approaches being developed in response to local needs and contexts in places like the Philippines and the West African nation of Burkina Faso. These are perhaps not traditionally thought of as the sorts of places where one should look to see the cutting edge of technology use. Might/should such 'traditions' be changing?

9. Calculating the costs of digital textbook initiatives in Africa, A few myths and misconceptions about digital teaching and learning materials in Africa & Investing in digital teaching and learning resources: Ten recommendations for policymakers
This set of related posts looks at the promise and possibility of providing things like 'digital textbooks' to learners in Africa who have been inadequately served by traditional textbook procurement activities.

8. ICTs and Literacy (the old fashioned kind)
Much is made of the importance of developing various sorts of 'digital literacies' necessary for success in an increasingly technology-rich world. But how might these information and communication technologies help promote the acquisition of skills and competencies related to the 'old fashioned' and most fundamental sort of literacy: the ability to read?

7. Surveying ICT use in education in ______
2014 witnessed the publication of a number of surveys of ICT use in education around the world. Viewed individually, they provide tangible data documenting what is happening in specific countries. Taken collectively, they help sketch out a rough, updated picture of the extent that technology is (and is not) appearing in schools around the world:
- Surveying ICT use in education in Central and West Asia
- Surveying ICT use in education in Europe
- Surveying ICT use in education in Latin America & the Caribbean
- Surveying ICT use in education in five Arab States

extra: A regular theme explored in posts on the EduTech blog is the importance of teachers -- and how technology can be used to support their work. Two related posts from 2013 include Teachers, Teaching & ICTs and Using video to improve teaching -- and support teachers.
6. **Who owns the laptops and tablets used by students and teachers, and how does this affect their use? + Who owns the content and data produced in schools?**

Belatedly, many education systems are realizing that issues of 'ownership' (of equipment, of data, of educational content) may need to be re-thought as a result of the increasingly widespread and strategic uses of new technologies. These two posts pose two thematically related questions -- and try to make a case for why we might care about the answers.

5. **The Matthew Effect in Educational Technology**

Much of the rhetoric and anticipation surrounding the use of things like laptops and the Internet in schools in developing countries around the world is related to their potential to provide previously disadvantaged groups with access to the sorts of learning tools that other, richer, more privileged groups have. But what if the widespread diffusion of these technologies increase, rather than decrease, the divides between learners, teachers, and schools, with the end result that 'the rich (measured in various ways, not all of which have to do with money) get richer'?

4. **A different approach to scaling up educational technology initiatives**

Much is made of the necessity to 'scale up' in international development circles. Why is it so difficult, for example, to move from a successful and promising small pilot initiative to do something that impacts many more students, teachers, schools and communities? This post helped promote the idea that, when attempting to do so, you may be more successful if you *"Start 'down and out', and then move 'up and in'"*.

*extra:* Videogames and Learning provided a quick roundup of what is known about the topic, while Broadband for schools? explored the different definitions assigned to various levels of connectivity around the world (and why these differences might be important).

3. **Missing Perspectives on MOOCs: Views from developing countries & More about MOOCs and developing countries**

The phenomenon of MOOCs -- massive open online courses which can attract thousands, and sometimes tens of thousands of students -- occasioned much hope and hype in 2013. A series of posts explored efforts in this area to help readers stay up to speed on issues and developments and debates and controversies in this fast-moving area. Other related posts included: MOOCs in Africa; Making Sense of MOOCs: A Reading List; and Debating MOOCs.

2. **10 principles to consider when introducing ICTs into remote, low-income educational environments**

For better and for worse (and mostly for worse, in my opinion), much of the planning processes for the introduction and use of ICTs in poor and/or remote communities in developing countries around the world have, at their core, a set of assumptions formed as a result of the use of such technologies in places that are neither poor nor remote. This post, probably (and hopefully) the most influential one to appear on the EduTech blog this year, attempts to consolidate what we know
about working with ICTs in such places, based on the past decade or so of activity and experimentation, and proposes an alternative set of assumptions or principles that might more usefully inform the plans and activities of policymakers and practitioners working in, or for the benefit of, such communities.

1. **Big educational laptop and tablet projects: Ten countries to learn from**

   The most read and circulated post of 2013 provides pointers to many of the interesting large scale educational technology projects that are taking place around the world. Until recently, such projects were almost exclusively to be found in 'highly developed' countries. This is no longer the case. Many poor countries around the world have in the past looked to inspiration and models for educational technology use to countries like the United States and the United Kingdom for the simple reason that a lot has been happening in such places. More relevant models may be found in the massive deployments in many middle income countries such as **Turkey** and **Uruguay** (and many others).

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OK, that officially wraps up the EduTech blog for 2013. 2014 should feature shorter, more frequent posts on a wider variety of topics and projects. As always you are welcome to visit the blog (we try to publish on Fridays) at [http://blogs.worldbank.org/edutech](http://blogs.worldbank.org/edutech), subscribe to our RSS feed and/or follow us on Twitter [@WBedutech](http://twitter.com/WBedutech) to find out. You are also most welcome to share and re-publish the items (on your site, via newsletters, in your publications) to the extent that doing so may be useful to you (all we ask for in return is that you credit and link back to the original post). Thanks so much for all of the people and organisations who did this over the past months and helped to provide some more exposure to the themes, ideas, challenges, people, research and organizations featured on the EduTech blog in 2013.

Thanks for your kind attention and interest. **Happy New Year!**

*Note:* The image at the top of this blog post of one man prattling on while his audience is consumed by either anguish or slumber ("will it ever end? five years of the World Bank's EduTech blog") comes via [Wikimedia Commons](https://commons.wikimedia.org) and is in the public domain.
Citizens’ Monitoring of the Education Sector in the Philippines

by Michael Trucano

#2: originally published on Tuesday, 15 January 2013

I have recently been involved in discussions with three countries that are considering *huge* new investments to introduce lots of new technologies in their primary and secondary education systems. Such discussions typically focus quite a bit on what technologies will be purchased; what additional products, services and support will need to be provided if the technology is to be used effectively; and how to pay for everything. Increasingly (and encouragingly), there is also talk of how to measure the impact of these sorts of investments. To measure 'impact' (however you choose to define it), you of course need to know what has actually happened (or not happened).

When you are putting computers in all schools, or rolling out lots of new digital learning content, or training lots of teachers, how do you know that these sorts of things are actually taking place?

In the pre-digital age, the most common way to find out answers to questions like, for example, Are any teachers actually using the computers and new multimedia materials that we purchased in their classes?, was often to simply ask teachers a related question as part of a survey. In some cases, in-person observations were then used to help validate the claims expressed in such surveys. Activities of these sorts are certainly useful, but interpreting the results can be problematic (respondents may tell you what they think you want to hear, your sampling of schools may leave a little to be desired, etc.). As schools become more 'connected', and as management information systems become more robust, increasingly there are technical means to help monitor automatically what is going on within parts of the system. Firms that have developed tools to help them remotely manage technical support across tens or hundreds or thousands of schools can also use those tools to help report to others on what is actually happening in the system. Educational publishers are increasingly baking in to their product offerings the ability to know how many times a particular online resource was accessed, for how long, and by whom. Some vendors tout the ability to actually see at a very granular
level how individual students are performing, tracking their clicks as they move through various on-line learning activities and interpreting and reporting on the results. Such things offer the potential to provide much more comprehensive picture of the extent to which various technologies are being used. (They often potentially make even more acute issues related to data privacy, a topic we increasingly find ourselves challenging education ministries to think about proactively ... and perhaps a topic for a future blog post.) Given the increasing prevalence of the use of online 'dashboards') to report on system performance, ministries of education are (connectivity and infrastructure permitting) able to access related information in real time (or close to it).

This is exciting stuff to be sure. But how do you know that the information system, or the vendor providing it, is telling you the truth? Ministries of education can become quickly overwhelmed by all of the data reported by such mechanisms, and may not have the expertise to judge if the technical reporting mechanisms themselves are accurate. In order to help with this, independent third party auditors can (and do) also help with this sort of stuff, but many ministries often revert to old, tried-and-true methods (e.g. teacher surveys, selected in-person observations of a few representative classrooms or schools, etc.) to help in this regard. In other words: exactly the type of practices they found inadequate in the first place.

There is another group that can be very well placed to help in this regard: 'ordinary' citizens. Why not make available to the general public some (or all) of the monitoring information reported to the ministry of education about vendor performance? If a vendor creates an online 'dashboard' that allows a group in the ministry of education to better monitor the roll-out of a particular component of a large scale investment in the use of ICTs in education, why not make this available (in whole or in part) to the general public as well? Citizens are paying for this stuff with their tax dollars, after all, and many of them may be closer to the level of activity, and possibly more personally invested in the outcomes of specific activities, than are bureaucrats sitting in a faraway central government office.

When assigned to do a seemingly overwhelming task all by himself, Mark Twain's 19th century literary figure Tom Sawyer got others to help him paint his fence. Why can't governments do the same? Many around the world are doing just this sort of thing, harnessing the power of various new technologies and the collective interests and energies of civil society groups and individual citizens to help monitor and report on the delivery of public services of various sorts. What might such a thing look like in practice in the education system in a developing country? A recent case study from the World Bank Institute attempts to provide a nuts-and-bolts description of how this occurred in a pilot 'crowdsourcing' initiative in Southeast Asia that has caught the excitement of educational policymakers on other continents, from Latin America to Africa to Europe.

A Case Study on Citizens’ Monitoring of the Education Sector in the Philippines [pdf], by my colleague Jennifer Shkabatur (with assistance and guidance from Luiza Nora), documents what exactly has happened with the
innovative CheckMySchool (CMS) project (which has been mentioned twice before on the EduTech blog), a "community monitoring project that aims to promote transparency and social accountability in the Philippine education sector by tracking the provision of services in public schools" -- things like the existence of sufficient numbers of textbooks, working toilets, teacher attendance, and use of school funds. This information is then made available on public web sites in easily accessible formats, in order for citizens to comment on the accuracy of the data collected and to voice related concerns and issues. This particular case study focuses not so much on what has been accomplished to date, but rather *how* CMS was created and implemented, in order to help share some basic practical information with countries seeking to do something similar, but which are not sure where to start:

"CMS is often cited as a “good practice” in the field, and the governments of several countries, including Indonesia, Kenya, and Moldova, are interested in adapting the CMS model to their country contexts. This case study sheds light on the design and implementation features of the first pilot cycle of CMS in public schools across the Philippines. The case study discusses the general political background and operating environment of the CMS project, its concept and operating principles, the roles and incentives of the major stakeholders involved in its design and implementation, and the ways in which CMS aims to use ICTs. In addition, the case study provides a step-by-step analysis of the first CMS project cycle in 2011, examines its accomplishments and challenges, and provides lessons from the first pilot year of the project’s operation. The case study concludes with recommendations for projects that aim to follow the footsteps of CMS."

There is much here that should be of interest to education ministries grappling with challenging issues related to monitoring the extent to which various activities planned at some central level are actually being implemented 'on the ground' at the local level. One of the major lessons from the case study is that "innovative ICT-enabled projects are an investment in the future of community monitoring". At a conceptual level, most people will probably find this to be a rather obvious finding. But just what to do with such an 'obvious' lesson may not be so obvious at all. The CMS case study highlights the extent to which non-ICT issues, like the importance of constructive, cooperative relations between civil society groups and government, and that "complementarity with ongoing government projects creates an environment conducive to initiatives". It especially highlights the fact that, even (or perhaps especially) in ICT-related initiatives, which are attractive because they often can allow for physical distances to be bridged and many things that used to happen in person can be done virtually, an "organized presence on the ground is critical." In the case of CMS, the use of so-called 'infomediaries' (local community leaders and socially active individuals recruited to assist with data collection at the local level and share results online) was seen to be a key ingredient in success, even where most of the actual exchange of project information was happening via the project web site and tools like Facebook.
A number of 'enabling conditions' existed in the Philippines that were also very important. The fact that the Philippines has a very active and capable civil society, that government was willing to make available basic data about public schools, that there were believers within government of the need for increased transparency and social accountability in the education system and that the CMS project team tailored its activities and approaches based on specific local contexts and cultural sensitivities -- all of these things were seen to be critical to the project, and it is noted that the combination of these factors in the Philippines may not be at hand in other countries. Countries immediately looking to replicate the Philippines experience using ICTs under CMS to help promote greater transparency and accountability in the education sector would do well to note that this was not the first large scale government accountability initiative in the education sector there. CMS was able to build on some of the partnerships and networks formed as a result of these earlier projects (like Textbook Count [pdf], which began a decade ago), and lessons learned from these projects greatly influenced what the CMS team hoped to enable through the innovative introduction of use of ICTs to complement earlier and on-going related activities.

The specific circumstances in the Philippines -- the local environmental and culture contexts, the alignment of incentives of various stakeholder groups -- may not apply in other places. Identifying where and how a country's circumstances differ in key regards from that of the Philippines (or other countries with interesting lessons from public accountability and transparency initiatives in the education sector, like India) will be important for those places seeking to adopt some version of the CMS model for their own purposes. However this analysis plays out, I expect that it will be the very practical, twelve step implementation process that the case study documents that will be of most immediate utility to policymakers in other countries planning similar transparency and accountability initiatives of their own. Many World Bank studies in both the education and ICT sectors attempt to identify and analyze key issues as an input into the policy formulation process. This quite useful case study functions more as a sort of how-to guide (or, given that it documents previous experience in the Philippines, perhaps calling it a 'how-did' guide might be more accurate) than as a means to advocate for a specific policy approach, or to evaluate the impact of a given policy approach.

Reading through the case study, it was clear to me that the potential of a mechanism like CheckMySchool is far from fully realized. That said, there can be little doubt that this sort of thing is quite promising, and one suspects that this is just the tip of the iceberg, providing some tangible examples about what the increased diffusion and use of a variety of ICT tools across societies makes possible -- and what might be coming.

Note: The image used at the top of this blog post of a lot of people jumping aboard the iconic method of conveyance in the Philippines, the jeepney (“let's all jump on and have a look inside and see what we might see”) is adapted from an image that comes via Wikimedia Commons from Flickr user dboy and is used according to the terms of its Creative Commons Attribution 2.0 Generic license, as confirmed by the FlickreviewR bot.
Broadband for schools?

by Michael Trucano

#3: originally published on Tuesday, 5 February 2013

Schools should be connected to the Internet. Most people, I suspect, would agree with that statement (although a few dissenters may contend that such a statement does not go far enough, and that all schools *must* be connected to the Internet.) Indeed: Lots of countries around the world have been, and are, engaged in efforts to connect all of their schools to the Internet -- and for those schools that are already connected, to connect them faster.

The efforts of the United States in this regard that began under the 'e-rate' program in the 1990s have been much studied and emulated around the world, and countries as diverse as Malaysia, Morocco and Turkey have sought in various ways to utilize Universal Service Funds to help connect the un-connected. Korea has perhaps gone the furthest in rolling out very fast connectivity to all of its schools. Armenia will soon (if has not done so already) have completed connecting all of its schools to the Internet; when I last checked (in late 2012), Uruguay had almost done so as well. Given current technology infrastructure and available funds, not all countries are of course yet able to connect all schools, even if they consider this to be a priority. (Even in a country as developed as Uruguay, 70 schools were reported still to be without electricity in early 2012 -- not being connected to the electrical grid can make efforts roll out connectivity to all a little more difficult ....) In countries where almost all schools can be connected via existing means, a lack of supporting government policies and/or incentives for groups to connect the unconnected schools can mean that, even where connections to the Internet are technically feasible, they may not be commercially or practically feasible. Some recent work by the World Bank found that 95% of all schools in Indonesia could theoretically be connected to the Internet now, if the political will could be found and provided certain policies and incentives were put into place. (Connecting the remaining 5% of schools -- no small number, in a country as large and diverse as Indonesia, with over 13,000 (!) islands and 250,000 schools -- would be much more difficult, as many of the schools in this 5% category are quite remote, and there are as a result often significant, and very costly, infrastructure challenges to overcome.)

OK, if all schools should (or must) be connected to the Internet, what should be the nature of that connection?
Again, most people would probably agree that, in 2013, all schools should have broadband connections to the Internet. This is, in fact, a common theme in many of the national policies related to ICT use in education one encounters around the world, especially in the more 'advanced' (OECD) countries, and increasingly in middle income countries as well. Reasonable people may (and do!) disagree about the extent to which school connectivity should be prioritized compared with other pressing needs in the education sector, but, while there may be a lack of consensus on the relative importance, the general importance of connecting schools, and indeed in doing so at broadband speeds, is a widely held goal in much of the world (even if it is not always practical in the near term).

That said:

**What exactly does 'broadband' mean when we are talking about connecting schools to the Internet?**

It turns out there is no simple answer to this query. Indeed, there are lots of different answers, depending on where you are and the context in which you are posing such a question.

Last year the World Bank published a collection of essays [pdf] as part of its SABER initiative looking at a variety of educational issues in East and Southeast Asia. SABER -- or Systems Approach for Better Education Results -- is an attempt to help countries systematically examine and strengthen the performance of their education systems with the help of some diagnostic tools that help officials compare education policies according to evidence-based global standards and best practice. In the chapter on 'ICT' [pdf] in the SABER East Asia publication, I looked at the state of ICT use across the region through the lens of a few of the 'core' ICT/education indicators which have been identified, and ended up questioning just what 'connectivity' meant for schools in the region, asking: When it comes to connecting schools to the Internet, is Mongolia more like Korea or Indonesia?

Across the region, as in the rest of the world, it is increasingly common to hear senior government officials call for “all schools to be connected to the Internet.” Of all the core indicators outlined by the UIS-led Working group on ICT Statistics in Education (WISE), progress toward the goal of “connecting schools” appears to be the easiest to measure, although defining what it means to be “connected” can often differ radically among countries. Let’s compare, for example, three countries: Indonesia, the Republic of Korea, and Mongolia. From one perspective, Indonesia is the outlier here, as only 11 percent of its schools are connected, compared to 87 percent in Mongolia and 100 percent in Korea.

Dig a little deeper, however, and a different picture emerges. In Korea, 100 percent of schools are connected to broadband Internet at some of the fastest speeds in the world. Of the schools connected to the Internet in Indonesia and Mongolia, almost all of them use fixed narrowband connections—less than 256 kilobits per second. So when one evaluates the state of school connectivity in Mongolia, the answer
depends on the goal, which may, on the one hand, be enabling teachers and students to communicate via e-mail or, on the other hand, be facilitating real-time access to rich media learning resources online. For the latter, a fast Internet connection is what really matters.

**How fast is 'fast' -- and how fast is 'broadband'?**

The Broadband Commission for Digital Development, a group set up in 2010 by the ITU and UNESCO, believes that "high-speed, high-capacity broadband connections to the Internet are an essential element in modern society, conferring broad social and economic benefits. Without broadband infrastructure and services, developing countries risk exclusion from participation in the burgeoning global digital economy." Its 2012 annual report [pdf] discusses the imperative of moving "from narrowband to broadband, from kilobits to gigabits". Just where to draw the line between narrow- and broadband is still as much art as science, however. The Commission's big 2011 report [pdf] looks at the different ways that broadband can be, and is, defined. One (seemingly) simple and straightforward way to do this would be to set minimum upstream and/or downstream transmission speeds. (I have added the word 'seemingly' here, because the differences between advertised speeds offered by service providers, and what is actually measured in practice, can vary quite a bit.) Alternatively, the report notes that you can define it based on the type of technology being used (e.g. 'fiber'), or by the nature of service being offered.

Whatever the case, the recent past seems to demonstrate that, in many education systems, as bandwidth supply increases, demand for the bandwidth tends to increase even faster, as applications previously considered luxuries are considered 'necessary'. (Someone has no doubt coined a shorthand 'law' of some sort to describe this phenomenon; if so, I'd be grateful if this could be added to the comments section below.)

Noting that different countries defined broadband differently, in its report *A 2010 Leadership Imperative: Towards a Future Built on Broadband* [pdf], the Commission "decided to focus on considering broadband as based on a set of core concepts, such as an always-on service (not needing the user to make a new connection to a server each time), and high-capacity: able to carry lots of data per second, rather than at a particular speed. The practical result is that broadband enables the combined provision of voice, data and video at the same time." After debating various potential ways of defining broadband (qualitative vs. quantitative, or some combination of the two), the Commission opined that countries could "distinguish the services they hope to provide via broadband networks, and work to establish the infrastructure capable of achieving those goals. By using this approach, it would be possible to avoid settling on a specific figure in terms of speed alone, and instead make recommendations to individual countries based on their level of existing infrastructure and their target services for the future."

infoDev's very useful broadband toolkit identifies how a number of countries attempt to define broadband in practice, from Brazil's qualitative attempt ("the provision of telecommunications infrastructure that enables information traffic in a
continuous and uninterrupted manner, with sufficient capacity to provide access to data, voice and video applications that are common or socially relevant to users as determined by the federal government from time to time”) to the more numeric targets expressed by countries like the UK (2 Mbit/s) to Finland (100 Mbit/s) to Korea (1 Gbit/s!). 2Mbit/s to 1 Gbit/s -- that’s a pretty large range! (1 gigabit = 1024 megabits)

Unsure what this means in practical terms? The broadband classroom section of the U.S.’s national broadband map has a useful chart that identifies just how long it would take a user to download various common types of media (a book, a song, a movie) at various speeds:

**Speed: Greater than or equal to 1.5 Mbps and less than 3 Mbps**
Within this speed tier, a typical consumer download experience would be:
- Book (1 MB in size) - 2.7 seconds
- Song (4 MB in size) - 10.7 seconds
- Movie (6144 MB in size) - 4 hours and 33 minutes

**Speed: Greater than or equal to 100 Mbps and less than 1 Gbps**
Within this speed tier, a typical consumer download experience would be:
- Book (1 MB in size) - > 0.1 seconds
- Song (4 MB in size) - > 0.1 seconds
- Movie (6144 MB in size) - 49.2 seconds

Most schools in developing countries today can unfortunately only dream of such connectivity. More common for them are

**Speed: Less than or equal to 200 Kbps**
At this speed, a typical consumer upload experience would be:
- Book (1 MB in size) - 40 seconds
- Song (4 MB in size) - 2 minutes and 40 seconds
- Movie (6144 MB in size) - 68 hours and 16 minutes

**Speed: Greater than 200 Kbps and less than 768 Kbps**
Within this speed tier, a typical consumer upload experience would be:
- Book (1 MB in size) - 10.4 seconds.
- Song (4 MB in size) - 41.7 seconds
- Movie (6144 MB in size) - 17 hours and 47 minutes

These speeds, it should be noted, are for a 'typical consumer' -- schools of course rarely have only a single 'consumer' at a time attempting to access the Internet! In such educational environments, bandwidth remains a very scarce resource. In such circumstances, school computer labs administrators often circulate some quick hints to teachers and students as a way to help decrease bandwidth bottlenecks, even if only at the margins. Caching content locally remains a powerful tool in this regard, as do things like recommending that users visit versions of web sites optimized for access on mobile phones (in extreme cases, the trusty 'turn off images' trick is still en vogue -- old African ICT4D hands may be surprised to know that services like lo-band are still around!). I do remember working with students in a school in Ghana
when the Internet ground to a halt because they all began to send email to each other -- using their Yahoo email accounts, which presumably meant that emails were essentially traveling halfway around the world in order to move between children sitting a few feet from each other.

The current questionnaire [pdf] being used by the UNESCO Institute for Statistics as part of its work leading efforts to collect globally comparable data on ICT use in schools in countries around the world asks about the availability of 'fixed broadband', which is defined as "high-speed connectivity for public use of at least 256 Kbit/s or more in one or both directions (downloading and uploading)." This questionnaire is currently being revised by UIS, as a result of what it and its partners have learned over the past two years since the questionnaire has been in widespread use by various groups as part of regional survey work, and because definitions such as this, while perhaps outdated at the time they were first introduced, have become much more so in the past few years as a result of technological and commercial advances. If not 256 Kbit/s, what should the new figure be? The UK target of 2 Mbit/s is seen by the telecom regulator there as too low; the Korean target of 1 Gbit/s is simply not realistic for any other country (with the exception, perhaps, of places like the small and wealthy Southeast Asian island nation of Singapore).

Letting each country define broadband according to its own practice (as the Broadband Commission contemplates) means that we wouldn't have globally comparable data in this area. Given that many of the places which advocate extending 'broadband' to schools cite a desire to be 'internationally competitive' in support of such efforts, variable definitions of broadband would most likely complicate efforts by a country to benchmark school-level connectivity against its 'competitors' around the world. In the U.S., an oft-cited recommendation issued by SETDA in 2012 was that, "by the 2014-2015 school year, schools have at least 100 megabits per second of connectivity to the external Internet for every 1,000 students and/or staff member". Some critics of this figure note that such crude measures ignore the potential importance (indeed, the necessity) of prudent
bandwidth management and optimization at the local level (the school, the district), and suspect that such targets are as much about meeting the needs of industry to sell equipment and related services to schools as it is about the education value of such goals. (The discussion thread that follows a related story on Slashdot highlights these sorts of perspectives.) Other critics note that such a target is simply far beyond the reach of most countries in the world, and so is impractical as an sort of attainable global benchmark.

One common rule of thumb that I hear mentioned in a schools context is that 'broadband is what you have when you can comfortably watch streamed video' -- with 4 Mbit/s considered to be a useful threshold at the user level in this regard. That said, people who try to collect data on school connectivity around the world note that, if you ask schools what connection speeds they have, they most likely will not know. As a practical matter, then, it may be better to ask them something that is easy to answer and verify, such as 'do you have a fiber connection to the Internet?'

So where does this leave us?

Planning for technology use in education is a messy business in many ways. The EduTech blog is in many ways an attempt to explore this messiness. Many posts here have begun by trying to examine and unpack seemingly simple questions, but end up asking more questions than they provide answers to. Upon re-reading, today's post on broadband in schools appears to fall decidedly in this category. My apologies for this.

Just as rationales in support of the roll-out of broadband to schools vary across countries, so too do the definitions of what 'broadband for schools' is meant to be. Even where they succeed in defining the term in 2013 (if indeed they do attempt to define it), I suspect that most policymakers will find that today's definition of 'broadband for schools' will inevitably meet tomorrow's definition of 'narrowband'. (Nobody says this stuff is easy!) A teacher in Kenya once told me that, in her definition, 'broadband is whatever is faster than what our school has now'. I suspect that this sentiment would resonate with many teachers, students, school administrators and communities around the world, and encapsulates a challenge for educational policymakers for many years to come.

Some useful additional resources:

- The ITU's Toolkit of Best Practices and Policy Advice toolkit from its Connect a School, Connect a Community initiative
- Benchmarking Access and Use of ICTs in European Schools [pdf] from 2006
- Australia's National Broadband Network
- from the U.S. Department of Education: Broadband Availability to U.S. Schools and Colleges
- If you are looking for data on school connectivity around the world, the ICT in Education data collection efforts being led by the UNESCO Institute for Statistics (UIS) will probably be your best source of information in the coming years
• Your best one-stop-shop for global connectivity statistics in general is the ITU, whose latest *Handbook for the collection of administrative data on telecommunications/ICT* was published in 2011. Each year the ITU and the World Bank publish a *Little Data Book on Information and Communication Technology*.

• The World Bank’s new ICT Strategy is "Transform, Innovate and Connect". The Bank’s infoDev program published a very useful *Broadband Strategies Handbook* last year that looks at how broadband is defined, why it is important, and how its development can be encouraged.

• In recent years a movement has developed that considers access to broadband a 'right'. Finland was the first country to grab headlines in this regard. Here is the much-cited UN report [pdf] that discusses access to the Internet in term of human rights [pdf].

(This blog post was inspired by conversations and email exchanges with colleagues at the UNESCO Institute for Statistics.)

*Note:* The image used at the top of this blog post of an advertisement for high speed unlimited broadband pasted to a tree in Bangalore, India ("if only this tree were outside my school!") comes from the Wikipedian Victor Grigas via Wikimedia Commons. The second image in the post ("um, that's actually a breadboard connection, not a broadband connection") comes from Wikipedian Mbroemme5783 via Wikimedia Commons. Both images are used according to the terms of their Creative Commons Attribution-Share Alike 3.0 Unported licenses.
Who owns the content and data produced in schools?
by Michael Trucano
#4: originally published on Wednesday, 6 March 2013

Last year an article on Mashable made waves among some of the people I follow on Twitter. *Kindergarten Teacher Earns $700,000 by Selling Lesson Plans Online* (a later article bumped the figure up to over a million dollars) may admittedly describe a rather outlier occurrence. That said, it did bring attention to some emerging issues related to the educational content developed by teachers as part of their jobs, and the fact that such work may have economic value that can be quantified and realized in ways that, as a result of the introduction of new technologies and technology-enabled services (and the emerging markets that such things can catalyze and fuel), would have been thought impossible even a handful of years ago.

Not many people go into the teaching profession to make a lot of money. Few students expect to receive any monetary reward for anything they produce in school (beyond perhaps a few congratulatory rupees now and then from their proud grandparents). However, as more and more digital content and data are generated as a result of normal day-to-day teaching and learning activities in schools, might these data and this content have economic value that can be monetized, and if so:

Who stands to benefit?
Who has the rights to this content and these data, and what might they do (and not do) with them?

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I have recently been working with three middle income countries at different stages of large scale deployments of ICTs in their school systems that are facing a set of very similar issues (although they perhaps don't fully appreciate this fact yet). One of them rolled out computers at scale about a decade ago and is now looking to enter a new phase of activity, another has just finished a large scale roll out, and a third is planning for one. All projects include large scale digitization of existing educational content and administrative data. In the course of these projects, various types of educational content have been, are and will be created and shared in digital formats, and lots of new data have been, are, and will be created, captured and shared by related information systems as well.
While we were not asked to comment or provide advice related to intellectual property and privacy issues as part of World Bank engagement in these three places (we are rarely are, in my experience, at least in the education sector), I thought I would investigate to what extent the education authorities in these three countries had thought about some related issues that might be raised by a number of basic use cases that we observed during the course of visits to schools and administrative offices and/or which emerged in the course of related discussions. Things like:

1. A student writes a research paper and sends it via a third party email service to her teacher.

2. A teacher creates a lesson plan and uploads it to the national education portal.

3. A student uses a digital camera as part of a science project and uploads them to an online photo-sharing service in the course of sharing them with his fellow students and teacher.

4. A student takes a test developed by an external vendor, which hosts the test and stores the test answers and results on its own (external) server.

5. A management information system collects personally identifiable data on individual teachers and students, with some of the data archived on systems outside of the country.

6. A learning management system licensed from a vendor automatically collects user data, which it uses to generate a series of automatic reports, and publishes some related analysis.

7. Student and teacher attendance information is input by teachers into a national education management information system, which is hosted on a vendor's servers.

After observing and talking about these (and other) seemingly simple actions, we asked some basic questions like:

a. Who owns this content?

b. Who has rights to access this content?

c. Who has rights to use this content (in various ways)?

d. Who can assign or transfer these ownership and usage rights to others, and under what conditions?

e. Who is liable if this content is misused, or where the existence of such data or content potentially violates an existing law or regulation?

f. Let's say you change platforms and/or vendors: How easy is it for you to export your content and data to some other platform or system?

Now, in some cases, people responded by saying they did not have answers to all of these sorts of questions, and that they didn't really care what the answers were: They had never considered them in the past and/or that they simply weren't that important.
**Fair enough.** It certainly isn't our place at the World Bank to tell the ministries of education with which we work what they should think is important, and what isn't.

*However ...*

It turned out that some of the vendors with which they had been working *had* in fact thought about these sorts of questions, and considered the potential answers to them important enough to cover in some of the contracts and licensing agreements that they signed.

*And ...*

Once these sorts of questions were posed to education officials, and we discussed their responses a bit, a number of them began to see how these sorts of things may indeed be important -- if not today, then perhaps at some point in the future.

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While no one with whom I spoke foresaw a kindergarten teacher in their system making over a million dollars as a result of sharing lesson plans on line (truth be told, I doubt school officials in the U.S. state of Georgia contemplated such an occurrence either!), the fact is undeniable that content and data are increasingly being made available in digital formats that mean they can be shared and aggregated in ways that were not possible in the days of teacher lesson plans being posted on blackboards, school assignments being written down on paper and placed on a teacher's desk, and school administrative data being recorded on myriad paper forms shipped off to some unknown office inside the educational bureaucracy (and, truth be told, probably soon forgotten).

Even where the economic value of such data and content was not immediate apparent, the potential **privacy** issues associated with such data (especially since so much of it relates to *children*) were often quickly grasped by education officials.

*What do you suggest we do, we were asked?*

While I personally didn't have easy, definitive answers to these sorts of queries, I began by asking them some quick follow-up questions, including:

*To what extent have these issues already been anticipated and addressed in your current rules, regulations and guidelines in the education sector?*  
(It turned out in some cases that there were in fact existing laws and guidelines that addressed, or seemed to address, some of these issues -- although perhaps not in the way the people who had originally drafted them had planned for.)

And:
How are data/content ownership and usage rights assigned and treated within the various contracts you have signed with third parties who are helping to implement various components of your ICT/education activities?

Even if you are not sure how you wish to deal with these sorts of issues in the future, I said, you may at the very minimum want to begin by seeing how/if you are actually dealing with them now.

Based on recent exchanges with these three countries, I do wonder how many other places might find it useful to start asking such questions as well ...

Note: The public domain image used at the top of this blog post of a piece of apple pie (‘who gets to eat this piece of pie -- and how should the pie be sliced up in the first place?’) comes via Wikimedia Commons.
ICTs and Literacy (the old fashioned kind)
by Michael Trucano
#5: originally published on Tuesday, 19 March 2013

The U.S. Library of Congress recently announced a set of literacy awards to recognize and honor pioneering efforts in the United States and around the world. That's all well and good, you might say, literacy is certainly a worthy cause, but what does this have to do with ICT use in education in developing countries, the topic explored on the EduTech blog? Potentially a lot.

Much is made these days of the need to foster the development of so-called '21st century skills'. Indeed, for the past few years I have sat through few presentations where this particular three word phrase has not been mentioned prominently at some point. Reasonable people may disagree about what these skills are, exactly (but there are lots of ideas), and/or about some of the groups promoting related discussions and initiatives. Whatever one's opinion on such things may be, however, there is no denying that ICTs -- and the ability to use ICTs (productively, effectively) -- are often prominently considered in many related conversations and advocacy efforts, which often also highlight the increasing importance of the acquisition of so-called 'new literacy' skills (variously defined, but often related to the use of ICTs in ways integral and tangential: computer literacy, media literacy, etc.) to ways of life that are increasingly impacted by the emergence of new information and communication technologies.

What it means to be 'literate' in 2013 may be different than it was in 1913 or 1963 (and it will perhaps be different still in 2063). That said, there is little argument that, whatever the year, and wherever you are, basic literacy skills are fundamental to one's education and ability to navigate successfully through life.

What do we know about the use of ICTs to help promote and develop literacy?

(I am not talking about such things like 'computer literacy', mind you, but rather literacy of the old-fashioned sort: the ability to read and write.)

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A number of groups have recently kicked off efforts to explore answers to this question -- and are seeking to highlight innovative approaches to finding such answers.

USAID, AusAid, World Vision and other partners are supporting a so-called 'Grand Challenge for Development' designed to get All Children Reading. As part of this initiative, a number of innovative programs and groups around the world have been awarded grants to explore new approaches to tackling longstanding challenges in this area focused on the provision and use of teaching and learning materials, as well as the collection, use and dissemination of education-related data. Many of the projects funded to date (here's a list) have strong technology components.

USAID and UNESCO (as well as the World Bank and a number of like-minded institutions) participate in the mEducation Alliance, which collectively explores how new classes of mobile devices (phones, tablets, etc.) can be used profitably and productively to help meet a wide variety of educational goals. The Alliance sponsors a working group explicitly looking at emerging innovations to use mobile technologies to promote literacy.

As part of its Mobile Phones and Literacy Project, UNESCO is studying emerging lessons from ten initiatives around the world, especially as they relate to empowering women and girls:

- AlfabeTIC (Argentina)
- Jokko Initiative (Senegal)
- Literacy by Mobile Phone Programme (Pakistan)
- MILLEE Project (China, India, Kenya)
- Mobile Literacy Program (Afghanistan)
- Nokia Life Tools (China, India, Indonesia, Nigeria)
- PAJEF Literacy Classes (Senegal)
- Pink Telephone Project (Cambodia)
- Project ABC – Mobiles 4 Literacy (Niger)
- Empowering Women Peacebuilders Project (Iraq)

The theme of how mobile devices can be used as part of literacy efforts was also featured prominently at the recent UNESCO Mobile Learning Week. UNESCO's new policy guidelines for mobile learning [pdf] highlight the fact that "Today mobile technologies are often common even in areas where schools, books and computers are scarce", suggesting that mobile ICT devices may become increasing important tools in literacy efforts in a number of places around the world.

Early Grade Reading Assessment (EGRA) tools like Tangerine are being developed and utilized as part of efforts to use mobile technologies to assess literacy, not only to help develop it.

While ICTs of various sorts are certainly no panacea to longstanding challenges related to illiteracy, aliteracy and low literacy, I would not be too surprised if shortlists of future potential winners of the Library of Congress international literacy
prize might not contain some of the projects being recognized and studied today as part of efforts of the groups mentioned here.

It is not only with the widespread availability of mobile phones and other handheld mobile computing devices that ICTs have been relevant to literacy efforts, of course. Organizations like Sesame Workshop (i.e. the Sesame Street folks) have been active for over four decades in exploring how technologies of various sorts, beginning first with television, can be utilized as part of literacy campaigns and activities. More recently, the efforts of PlanetRead to promote literacy through 'same language subtitling' (i.e. subtitling the lyrics of existing film songs or music videos on TV, in the ‘same’ language that they are sung in) have been recognized by a variety of groups for their innovations in supporting literacy efforts at large scale in places like India.

Even if it is (perhaps) too early to consider literacy efforts of groups utilizing mobile technologies as viable contenders, might groups like Sesame Workshop and PlanetRead be candidates for the new Library of Congress Literacy Awards? Perhaps. There are scores of other groups that would be good candidates as well -- please feel do free to nominate individuals, groups and initiative that you consider worthy of special recognition for efforts to promote literacy around the world over on the dedicated page on the Library of Congress web site. The deadline for submitting nominations for the first set of prizes (which total $250,000 annually!) is 15 April. (Disclosure: I serve on a related external advisory group.)

More information about the state of literacy worldwide:

The UNESCO Institute for Statistics (UIS) is responsible for monitoring international
literacy targets associated with Education for All (EFA) and the Millennium Development Goals (MDGs). Its literacy statistics are considered the standard for benchmarking progress globally and are featured in diverse reports, such as the EFA Global Monitoring Report, the World Development Indicators and the Human Development Report.

The World Bank draws much of its literacy-related data from UIS.

The Global Partnership for Education has early grade reading as a specific focus area.

You may also be interested in these earlier posts on the EduTech Blog:

- Mobile Phones and Literacy in Rural Communities
- How (not) to develop ICT literacy in students?
- What Sesame Street Can Teach the World Bank
- An update on the use of e-readers in Africa

Note: The image used at the top of this blog post ("lego ergo sum, or I read, therefore I am") comes from Jean Guillaume Le Roux via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license. The infographic on global literacy challenges is adapted from a larger graphic [pdf] produced by All Children Reading.
Few projects to introduce ICTs at scale across an entire education system have received as much global attention as that of Plan Ceibal in Uruguay, which has (among other things) provided free laptop computers to all public school students.

Anticipating that some of the lessons learned in Uruguay may be relevant to scores of other countries (developing and developed alike) in the years to come, we at the World Bank have been keenly following related developments in this small South American nation over the past half-decade. In addition to maintaining the typical sorts of on-going dialogues we have with countries around the world on education issues, last year the World Bank sponsored a study tour for policymakers from Armenia and Russia to visit Uruguay and see with their own eyes what has been going on, and to talk directly with some of the people who have helped make it all happen. We also helped coordinate an online ‘ideas festival’ to help connect educators across Latin America to share lessons about 1-to-1 computing initiatives, with a special focus on Uruguay. A presentation on Plan Ceibal by the president of the initiative, Miguel Brechner, at one of the previous global symposia on ICT use in education that the World Bank co-sponsors each year with the Korean Ministry of Education and KERIS each year in Seoul, remains one of the highest rated sessions in the six year history of that event.

That said, there has not been a terrific amount of information available in English about the project for global audiences. Those handy with online translation tools can perhaps make their way around the information-rich Plan Ceibal site (and may stumble across the occasional report in English, like this one [pdf] summarizing official results from the first national monitoring and evaluation exercise). Dedicated readers of the EduTech blog, as well as sites like the independent OLPCnews.com web site, will probably have read some of periodic posts looking at various aspects of the Ceibal program. YouTube fans may have come across some of the related subtitled videos available on that popular site (like this one), many of them on the dedicated Canal Ceibal channel, or of presentations by Miguel Brechner at events like WISE 2012 or ALT-C.

Such information sources, while certainly useful, are by their very nature backward looking. A fascinating new report commissioned and recently released by Plan Ceibal aims to help chart the way forward for the project. Ceibal: Next Steps [pdf], written by Michael Fullan, Nancy Watson and Stephen Anderson, provides...
very useful short summaries of the first two phases of pioneering Uruguayan initiative before offering four concrete recommendations to help guide the project as it enters its 'third phase' of activity, which Fullan and company have labeled "focused implementation".

This report is highly recommended for people with an interest in learning more about the Ceibal project, as well as for those wondering about potential examples of what might most usefully come 'after' the initial period rolling out and supporting hardware and software infrastructure that defines most large scale 'big bang' attempts to introduce ICTs across an education system.

Considering potential 'next steps' for Uruguay may help shed some light on emerging issues and options potentially relevant to other countries. This may be especially true for middle and low income countries which, while perhaps currently not as far along in the process in rolling out ICTs and connectivity as Uruguay is, would do well to consider what they may want to do after they have declared their initial large scale roll-outs of hardware, software, digital content and initial teacher training to be a 'success' -- and are then faced with the more difficult ongoing challenges of utilizing these investments to help bring about more fundamental and long-lasting changes to teaching and learning practices inside and outside of schools.

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Those familiar with Fullan's work will perhaps not be too surprised to see that he and his colleagues have examined Ceibal through frameworks that he has written about in some of his previously published materials, informed by his work in the Canadian province of Ontario (if you are looking to quickly acquaint yourself with related background materials, you may wish to have a look at this white paper [pdf] he did for ITL Research and this short video, as well as a 15-minute interview and companion review of one of his recent books).

**Next Steps** attempts to "explore Ceibal and its role in Uruguayan education from the perspective of whole system reform and what is known about educational change".

The paper begins by noting that

*Uruguay is not alone in facing the "whole system" challenge. As countries around the world grapple with the need to better prepare students for the challenges of globalization and what has been termed “21st Century Skills,” education leaders and policy makers have increasingly focused on how to raise the caliber of teaching and learning, not just in a few schools but across entire systems. Fullan argues that a limited focus on low-performing schools or on new schools that will start afresh will not address challenges of scale – what is needed are policies and strategies that focus on the culture of teaching and leadership. The aim must be to develop the entire teaching profession and to do so by leveraging the power of groups of teachers and*
administrators focusing on student learning. In such a context, applying lessons from decades of studying educational change, school systems can improve dramatically, whatever their starting points.

The “drivers” that will engage educators on a sustained basis and lead into cycles of continuous improvement, must meet the following criteria:

- foster intrinsic motivation of teachers and students;
- engage educators and students in continuous improvement of instruction and learning;
- inspire collective or team work;
- and
- affect all teachers and students.

The paper later goes on to state that adding technology to the “whole system reform” mix, Fullan [...] argues for the power of bringing together advances in pedagogy (how we learn), in technology (especially around engagement), and in change knowledge (especially around making change easier and more widespread). Although he acknowledges that the big educational advances in integrating technology and pedagogy are still to be developed he makes a case for exploring how “technology, well used, can help us race rapidly to a future that humankind wants and will find fulfilling”.

(Please note that, for the sake of readability, I removed many parenthetical references to Fullan's own work from the short excerpts above; those interested in such things are directed to read the actual report.)

The report quickly, and quite usefully, summarizes both the Uruguayan school system (which has some interesting characteristics and quirks that may surprise many educational policymakers in other countries) and the first two phases of Plan Ceibal, which it labels “a matter of access” and “adding support elements”. This section represents perhaps the best short primer (a dozen pages or so) from an outsider on what Ceibal has done to date.

[side note on English teaching and robots]

Next Steps briefly refers to two Ceibal initiatives that have not received widespread attention outside of Uruguay related to (1) the remote teaching of English and (2) robotics. (Please note that these are two separate initiatives; if you are interested in examples of the remote teaching of English with the aid of robots, you’ll need to look to a place like South Korea …). Here's some more information and a
related video on the remote teaching program in Uruguay, which is being done with the British Council, and two videos showcasing some of the robotics work (unfortunately no subtitles on these two for non-Spanish speakers, but it should be pretty obvious what is going on).

many perspectives on Plan Ceibal

Taking stock of these first two stages of activity under Ceibal, the report finds that "these have been appropriate startup actions to set the stage for further development" and then goes on to note that the next phase is the hardest one because it involves ‘quality implementation’. [emphasis added]

The report concludes by offering four targeted and related recommendations for Plan Ceibal going forward. In the interest of space, I won't attempt to summarize and comment on all four of them here, and will instead only focus on the first recommendation:

Successful systems, especially those at the beginning of an improvement cycle focus on a small number of key goals and ours and pursue them relentlessly. We recommend three:

i) Literacy (both Spanish and English)

ii) Mathematics

iii) Reduction of repetition of grades especially in grades 6, 7 and 8 with the goal of increasing high school graduation rates.

It will be necessary to sort out Ceibal’s role in each of these priorities. In the first two Ceibal could be a lead partner, while in the third goal — reducing repetition — they may play more of a support role to authorities.

Focusing on the three priorities does not mean that there are no other educational goals that are valued just that these three are elevated as core priorities. These particular three are valuable because they are turnkeys to educational success in other domains of schooling.
In my experience, few documents of this sort (i.e. those featuring strategic recommendations to the leaders of large scale educational technology initiatives) that I have come across in countries where the World Bank is active begin by explicitly considering the role of the initiative itself within the larger goals of the education system of which it is a part. (This is perhaps an unfortunate, and regrettable comment to make, but I find it to be true, in most cases.) It is refreshing to see such analysis here. Why is it that so few large-scale educational technology initiatives introduced with rhetoric about the 'transformational' potential for a country’s education system are explicitly utilized by policymakers as strategic levers to help effect systemic change? That is perhaps a question for a later blog post ... 

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**Next Steps** concludes in part by recommending that

*Ceibal should continue to be a catalyst for change -- seeding innovation, helping to provide focus for improvement across the system, generating collaboration and energy for system stakeholders to take action. And the system itself should increase its role, as we have recommended, as a strong partner in leading system improvement.*

People looking for insight on just how an educational technology initiative can be a catalyst for change within an education system could do worse than to read this report.

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*Some previous EduTech posts that might be of interest:*

- Uruguay's Plan Ceibal: The world's most ambitious roll-out of educational technologies?
- What's next for Plan Ceibal in Uruguay?
- How do you evaluate a plan like Ceibal?
- What happens when *all* children and teachers have their own laptops
I tried -- and failed -- to figure out a way to integrate themes from this recent New York Times article into the blog post above, but some of you might find it interesting nevertheless: *Pastoral Uruguay Yields a Crop of Digital Yetis and Adventures*.

*Note*: The three images used in this blog post all come via Wikimedia Commons and are used according to the terms of their Creative Commons Attribution-Share Alike 3.0 Unported licenses. The image at the beginning of the post of an Uruguayan classroom ("looking ahead") is from Cecilia de la Paz. The montage in the middle of the blog post of laptop use in a school in the town of Cardal ("many perspectives on Plan Ceibal") is from Fernando da Rosa Fedaro. The final image of Plan Ceibal headquarters comes from Wikipedian NaBUru38.
A new wave of educational efforts across Africa exploring the use of ICTs
by Michael Trucano
#7: originally published on Friday, 5 April 2013

A delegation of French businesses, together with some of their African partners, visited the World Bank last month to share lessons emerging from their recent efforts to utilize "digital technology to provide quality education for all", and to outline some of their related upcoming initiatives and activities.

The focus of much of the small workshop, which included World Bank staff working in the education sector and the ICT sector (and a few of us whose work straddles both areas), was on the activities of 2iE, an international, nonprofit higher education and training institute which provides training programs, courses and degrees in the areas of water and sanitation; the environment; energy and electricity; civil engineering and mining; and managerial sciences. 2iE, which the World Bank has supported in various ways over the years, is affiliated with the French network of "grandes ecoles" and trains 2000 students from Africa at its campuses in Burkina Faso.

98% of 2iE graduates work in Africa. A little more than a decade ago, almost 100% of its graduates went into the public sector; now 85% join private companies. Paul Ginies, 2iE's executive director, noted that across much of Africa, the middle class is growing faster than the capacity of higher education systems can accommodate. At the same time, the pipeline of students who can potentially take courses at institutions like 2iE is dependent on the quality of general education in the countries from which these students come. Even as we talk about the need for students to develop 'new literacies', often related to the use of new technologies, 'old literacies' become even more important. Ginies observed that only 8% of students in Burkina Faso study science, and only 4% study engineering -- and yet demand for graduates in these disciplines continues to grow.

(At this point in Ginies's presentation [pdf], I was reminded of a related conversation a few years ago, when a senior vice president of a Fortune 50,
multinational company stopped by our offices and stated that his firm was experiencing growing demands for its products and services across many African markets. *We want to hire Africans to run our businesses there, and make investments in local ecosystems of African businesses to help grow strong partner companies in local markets,* he said, *but we just can't find enough people with the skills we need.* *What can be done to support education systems to produce more graduates with the types of skills -- technical, scientific, managerial -- that we are looking for?* Of course, it is not only large foreign multinationals that are asking such questions, but African firms as well.

As successful as 2iE's current model of educational delivery is, one wonders: *How can it be scaled to reach more people?* Indeed: *Can it be? And if not: What other models might be relevant, and practical?* Current labor market needs are so great, and immediate, and demand for higher education so large, that other models are being aggressively explored, with an emphasis on linking university offerings to the needs of the private sector.

Given that I am discussing 2iE here on the World Bank's EduTech blog, it will probably come as no surprise to readers that that 2iE is increasingly offering courses via e-learning. It is exploring pay-as-you go models, where students only pay for one course at a time, with special interest in utilizing various emerging m-payment schemes (m-payment options are important, given that online payments systems are for the most part not in place in Africa). It is experimenting with ways in which it can integrate smartphones (still a small minority of phones used across Africa, but whose use is growing rapidly among 2iE's target student populations) into its service offerings, as well as SMS-based outreach campaigns to reach potential students across the continent.

A low-cost, pay-as-you-go model is at the heart of many of the innovative business models 2iE is pursuing. By breaking payments into small pieces, and not requiring that (for example) a student pay an entire semester's tuition. Such schemes are much easier to self-finance than many tradition approaches -- especially important where sources of student aid can be rare. As relevant to their needs and as their finances allow, students can proceed one course, and one certificate, at a time, with the possibility to aggregate these courses and certificates into full-fledged degrees over time, at a pace that suits them. "An African solution for the Africa economy" is how 2iE describes this approach, which is labels the *taxi model* ("taxi-brousse"):

- you start when the car is full;
- you drive for as long as you need -- and can afford;
- if you don't like the ride, you can get out and find another taxi.

2iE's efforts in these areas were featured in the 2012 WISE publication, "Learning a Living: Radical Innovation in Education for Work", one of fifteen case studies of innovative models for education around the world.

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As part of its CSR efforts, the large French telecom company Orange has been helping to finance small pilot 'e-education' projects across Africa, supporting partners delivering education projects, products and services. Orange faces a business challenge as it seeks to grow in rural areas across Africa, and so is exploring new mechanisms to engage with potential consumers of its products and services in such places in ways that are relevant and useful. One notable project has been training 500 primary school teachers with the aid of mobile phones in Madagascar over the period of a year, an activity it is doing in partnership with the Agence Française de Développement (AFD). Quizzes are sent each week via SMS to test teacher knowledge and expertise in various subjects. As part of this effort, they are using the 'Orange Money' mobile payment system to pay per diem and other monies to teachers directly. In speaking about the potential for the Orange m-payment scheme to increase transparency around the payment of teacher salaries in Madagascar, Ralph Ankri from Orange (here's his presentation [pdf]) recounted the response of one teacher participating in an m-payment scheme in Bangladesh, who asked, "How come my salary has increased?" One impact of transferring money directly to teachers via mobile phone could be to effectively cut out the middle man -- who may have been taking a cut of these sorts of monies in the past! As part of the Orange project in Madagascar, a call center is maintained to support teachers who call in with questions; when lots of similar questions come in, they are bundled together and featured on a local radio program -- together with the answers. Also in partnership with AFD, Orange is supporting a small two-school pilot effort in Niger that is utilizing tablet computers in classrooms; an external evaluation of these efforts is due out soon. Ankri noted that the tablets being used come from a Congolese partner, an example of a 'designed-in-Africa, manufactured-in-China' collaboration that may become more common in the future.

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This is the first in an occasional series of new posts that will look at some emerging activities across Africa that are exploring new ways to utilize ICTs to help meet challenges in the education sector. Whether such initiatives remain interesting but ultimately small pilot projects, or if they eventually demonstrate approaches that are relevant, useful, cost-effective, scalable and sustainable over the longer term, remains to be seen.

After a few years where many of the 'innovative' ICT/education projects across the continent have struggled to exit the 'pilot' stage (or indeed, had disappeared), we are seeing the beginning of a new wave of activities, many of them seeking to capitalize on the increasing ubiquity and power of mobile phones and related devices. While many such initiatives are, as in the past, supported by groups from 'outside', based on recent discussions I have had with lots of groups active, and looking to be active, in supporting and implementing these sorts of activities, an encouraging number of the groups in this 'new wave' appear to be cognizant of the lessons (and failures) of past efforts (many of which we tried to catalog at infoDev in the two-volume Survey of ICT and Education in Africa a half decade ago). Let's hope that this time around the results will do more to help support the development of a generation of 'makers' in Africa who can help ensure that African schools not only graduate future workers and consumers who will represent a source of profits
for IT and other firms in the rest of the world (Africa's importance in this regard will only continue to grow) but, more importantly, do their part to help educate future generations of innovators and entrepreneurs who will export their products, services and ideas across the continent, and across the world.

Also of potential interest:
- **Education & Technology in Africa: Creating Takers ... or Makers?**
- Here are some other EduTech blog posts related in various ways to the uses of ICTs in education in Africa.

*Note:* The image used at the top of this blog post of a street scene in Burkina Faso ("young men on the move in Bobo-Dioulasso") is adapted from a photo by the Wikipedian Adam Jones, Ph.D. It comes via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license.

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*SPECIAL NOTE:* In the version of the blog post as it initially ran, the quote from Ralph Ankri was erroneously attributed by me to a teacher participating in Orange's pilot initiative in Madagascar. In fact, this was actually from a teacher receiving an m-payment as part of a project in Bangladesh. The point in relating the anecdote was to highlight the potential for m-payments to increase transparency in the way that teachers are paid: in Madagascar as in Bangladesh and elsewhere.
MOOCs in Africa
by Michael Trucano
#8: originally published on Friday, 12 April 2013

MOOCs? MOOCs!
The excitement about the promise and potential of Massive Open Online Courses is white hot in many quarters. For those who aren't familiar with the phenomenon:

A MOOC is an online course, usually at the university level, offered for free over the Internet which aims for large-scale (some courses have enrolled over 100,000 students at a time), 'open' (anyone can join) participation over the Internet.

Daphne Koller, the co-founder of Coursera, one of the largest and best-known MOOCs (the two other 'leaders in this space are Udacity and edX) stopped by the World Bank in late February to talk about what Coursera is doing, and learning. While MOOCs have enrolled students from developing countries pretty much from the start, there have not yet been many attempts to systematically include MOOCs as part of targeted education efforts in low income countries.

What might such an attempt look like?

With support from the World Bank, a new pilot initiative in Tanzania is seeking to incorporate Coursera offerings as part of a broader initiative to help equip students with market-relevant IT skills. Employers in Tanzania complain that there is a mismatch of skills in the local labor market. Many jobs go unfilled because there are deficits of people with the relevant skills in the local market. There is a growing need for IT and ICT knowledge and skills necessary meet growing demand for technically skilled workers across Tanzanian corporations. For this and other reasons, Tanzania is trying to improve the quality of its higher education system. Currently a very small number of highly capable African students go abroad to meet their related educational and training needs. At the same time, Tanzania is hoping to improve its capacity to attract high caliber students from across the region to study at Tanzanian universities. What, then, to do?

The World Bank's NESAP-ICT program has been trying to help countries with such challenges. The New Economy Skills for Africa Program - ICT was launched in 2008 to support countries in Sub-Sahara Africa (SSA) in building skills for the knowledge economy. It has focused initially on supporting the development of globally benchmarked, employable skills for the Information Technology (IT) and IT Enabled Services (ITES) industry -- sectors that can create thousands of new jobs and catalyze economic and social transformation. (Here's a related World Bank
In Tanzania, NESAP-ICT is helping to support the development of what are known as SMART Knowledge Hubs, which are hoped to help form a 'backbone' of sorts the development of education in IT and a broader set of 'new economy skills' in the country. The SMART Skills (Software, Mobile Applications, Research and Technology) project began by asking about the type of IT-related skills are being sought by the local IT sector, and about the demands from students to acquire such skills that aren't being met by existing course offerings from Tanzanian institutions. The first related pilot effort is supporting the creation of a 'knowledge hub' in Dar Es Salaam, directed and coordinated by COSTECH, the Tanzania Commission for Science and Technology. It is hoped that this initial SMART Knowledge Hub will serve as a model for how to do similar things in other parts of the country.

What might MOOCs have to do with all of this?

The project in Tanzania is, together with Coursera, identifying a MOOC IT curriculum aligned with the needs of Tanzanian private sector employment tracks. The first stage of this process includes the design and development of the overall curriculum, informed by input from lecturers in IT and business in Dar Es Salaam, as well as from entrepreneurs and local businesses. The idea is to support students in various ways as they participate in MOOCs as part of their studies, in advance of the traditional recruiting season that kicks off at the start of the summer.

- How can students identify MOOCs that are relevant complements to their current areas of study -- and improve their future employment opportunities?
- How might MOOCs be formally incorporated into such formal study, with official credit given for the successful completion of a MOOC?
- More broadly, how can a higher education system align itself to help meet some of the immediate hiring needs of local industry, especially where local institutions may not currently have the capacity to develop and offer courses that help sufficient numbers of students develop the types of skills demanded by the labor market?

These are just some of the questions being explored as part of the SMART Skills project in 2013.

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This is the second in an occasional series of new posts (here's the first one) looking at some emerging activities across Africa that are exploring new ways to utilize ICTs to help meet challenges in the education sector.

It is also the first of three EduTech blog posts about that will be published in quick succession on the topic of MOOCs. Making Sense of MOOCs -- A Reading List and Missing Perspectives on MOOCs will follow.
You might also be interested in a related online discussion that has been happening over at the EduTech Debate site.

Note: The image used at the top of this blog post of a Masai boy in Tanzania moving toward a group of cows (“those aren’t moos you hear on the African horizon, but MOOCs”) was originally posted to Flickr by Andreas Lederer; it comes via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution 2.0 Generic license. The image below of what James Joyce famously called a moocow was a finalist in the Wikimedia Commons Picture of the Year 2007 competition. It comes from Daniel Schwen via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license.

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notes from talk by
Daphne Koller, Coursera
@ The World Bank, Washington, DC
21 February 2013

To help share lessons from Coursera’s activities to date (given its current size, and public profile, it is still hard to believe that the company was only formed in 2012!),
Professor Koller provided a detailed overview of some of the things the MOOC provider has been doing over the past year, and what it has been learning along the way, as part of a discussion called *Free Massive Open Online Courses (MOOC) to Accelerate Youth Employment in Africa*. The talk is available in full through this link. Please note that you'll need to install an Adobe Connect plug-in to watch it (one of my browsers balked at doing this -- you may want to experiment with using more than one).

For those of you who do not have 90 minutes to devote to watching the video -- or who are not sure if it is worth your time to do so, or who have technical problems -- I thought I'd share some of my notes from her fascinating presentation, in case doing so might be useful. This is basically a longer, and updated, version of her celebrated *Ted Talk*.

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**A global challenge**

Koller began her talk with a very sober example of the demand for higher education around the world that isn't being met. She spoke about the stampede that occurred in South Africa when *thousands of students tried to register for a limited number of last minute places at the University of Johannesburg* and then showed a graph detailing the steady rise in costs of higher education. Her point: Both demand and costs are increasing. *What might we be able to do in response?*

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**Speed and scale**

In September 2011 Stanford University opened up three computer science courses for participation by anyone over the Internet. Over 100,000 people signed up for each. The course on machine learning offered by Andrew Ng, who co-founded Coursera with Koller, normally reaches about 400 students each time it is offered on the Stanford campus. When it was offered over the Internet, over 104,000 people registered for it. To reach that number of people with his 'traditional' course at Stanford, Ng would have to teach the course for 250 years (and of course he wouldn't reach the same geographically-dispersed population of students).

Less than a year and a half later, Coursera now registers 1.45 million course enrolments each month, in a variety of subjects, in partnerships with scores of universities, and the other MOOC platforms are growing as well. Indeed, everything is happening at warp speed: Some of the data in the slides that Koller shared, which she had presented to a different group only the day before, were already out of date as a result of *new announcements*. At the time of Koller's talk, Coursera had signed up 61 university partners, primarily in North America, with almost all courses to date offered in English.

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**Testimonials from students**

Koller shared examples of emails from people who have benefited from participation in a course from Coursera and its partners which offered access to...
learning opportunities that they didn't otherwise have, for reasons of geography, disability, illness or cost.

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**General overview**

MOOCs like Coursera differ from so-called open courseware (like the MIT OCW initiative) in that they are complete courses, and not just a collection of course materials. The start and end at a pre-determined time, feature weekly assignments, and homework that is graded.

Students successfully completing a course receive a certificate. Until recently (more about this later in the talk) it was not possibly to get official 'credit' for completing a Coursera course. Koller stated that, even without official credit, students have been able to present Coursera certificates to employers and land jobs as a result.

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There are three pillars of the Coursera experience: video; assessment; and community.

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**Video**

The use of video helps break geographic boundaries. Professors have been videotaped "in the field" (and literally in fields!), conducted video chats with select numbers of randomly-chosen students (with the video archived so others can watch later), and even appeared as a character in a video game.

The length of university lectures depends largely on the availability classroom space. Online these space constraints disappear, and so there is an opportunity to break things up into smaller chunks so that the time allotted to each matched the content better -- and corresponds better to a learner's ability to follow and engage with the content (this is of course not a learning unique to the Coursera experience, lots of other online education providers do the same thing).

One professor leading a course offered through Coursera noted that the nature of MOOC discussions are different: each year his Princeton students at Princeton said things that were largely the same, but the interactions and comments made by his much larger number of globally diverse students taking his MOOC were much more diverse.

Koller then went on to talk about pedagogy and interaction in a MOOC -- and how the platform can enable the types of pedagogical approaches and interactions that Coursera feels, based on available research, are important.

(A side note: Coursera crowdsources the subtitling of videos in different languages using an online tool. This is quite interesting! Translations into additional languages can be done very quickly, as additional translators can be brought in and would only have to do text, not audio, translation.)

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Assessment
If you have 100,000 students in a MOOC, and no one is willing to pay for 5000 teaching assistants, how do you grade and provide meaningful feedback?

Computers are helpful in many cases. Using computers to handle things like multiple choice, short answers, and math expressions is not that difficult, but you can do a lot more than that. Anything that has a structured output, Koller said, can be graded by a computer (an example would be including things like Excel spreadsheets developed in a marketing class). A benefit of automated grading is that it allows students to achieve mastery through immediate feedback and repetition (this is not an insight unique to Coursera, it is a more general observation about the potential utility of computer use in education).

A common and criticism: 'Students could just keep doing the same problems until they get a correct answer -- are students really learning in such cases?' Koller replied that there is evidence that yes, they are. (She then showed a slide at this point that proclaimed 'for students of similar performance, mastery-based score improvements correlate with future performance' with supporting graph.) 'How do you grade things that computers can't grade, like essays?' Koller replied that you have students grade each other, noting that Coursera's approach in this regard this draws on work in calibrated peer review at UCLA. You can also use crowdsourcing. Involving students in the assessment of work by other students has a further educational value. A student learns by critiquing content, and then learns through the critiquing of the critiques of others.

Does this work? It depends on the grading rubric you construct to guide and assess this, Koller said. She then showed how peer grading can be used to help assess creative, open-ended assignments, using examples from a design course that showed prototype models made by students in the course (one example was from India, another from Spain, a third from the Philippines), who then provided input and feedback on the prototypes. Some professors participating in courses offered through Coursera are now introducing peer grading in their face to face courses, she noted, not because they can't hire enough teaching assistants (they can), but rather because they see a pedagogical value in this approach.

Community
Peer grading can also be used to create a sense of community and discussion among students. To illustrate this, Koller showed an example of how one essay uploaded in a course received 59 comments and 872 views -- far more than would have been possible in a traditional classroom setting. She said that, while you can't scale up instructor time to interact directly with students, you can scale up the number of interactions between students by leveraging the 'power of the crowds'. The result? Many more interactions in the virtual environment of a MOOC than in a physical environment. She then considered a potentially counterintuitive question, asking: Might larger classes actually be better (at least in this regard) than smaller classes? A provocative question, and one perhaps worth thinking about. Students also self-assemble into both physical study groups by geography: one group in
Buenos Aires, for example, another in Cape Town, yet another in Kansas City. (There are presumably lessons from such experiences of relevance to the Tanzania pilot which the World Bank is supporting.)

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**Credit and credentials**
What do students get at the end of a course offered by Coursera (beyond having learned something, of course)? Coursera began by awarding a letter from the course instructor which contained lots of legal boilerplate language at the bottom, stating things like this is not a Stanford degree, we can't vouch for the identity of the student, etc. Even in the early days, there were examples of universities giving credit based on this letter.

Koller was interrupted at this point by a question about why Stanford itself doesn't give credit. She mentioned that there are lots of issues at play here. Stanford students pay a lot of money to get Stanford credit, if they could pay nothing and still get Stanford credit, what would Stanford's business model look like? Stanford would argue -- and Koller would agree -- that Stanford credit for on-campus courses is a different currency than credit for a Stanford MOOC. Koller argued that the value of a Stanford course on campus is higher than that of a Stanford MOOC, but suggested that we shouldn't be comparing these two things. Rather, we should compare the quality of a Stanford MOOC with other types of learning experiences that are available.

Now Coursera also offers a 'verified certificate', where students opt in to a scheme where their identity is confirmed (via a biometric profile). This certificate has a university brand/logo on it, and the certificate itself has a permanent place on the Coursera web site. This means that the certificate can't be misplaced over time, and that the certificate itself is verified. While you can forge a PDF or a certificate or letter that you download, Koller said, you can't forge the certificate that is on the Coursera web site itself. Students pay a small amount to be verified ($30 was mentioned).

Koller talked about American Council on Education credit, which can be used to acknowledge participation in non-traditional sorts of learning activities. If a student has ACE credit for a course, she can then take it to her university and ask for credit. This gets around the issue of needing Stanford, or another Coursera partner university, to offer the credit itself, as the student can still get credit if her home university accepts the ACE credit. Five introductory Coursera courses now qualify for ACE credit.

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**Statistics and analytics**
What can you do with the data generated as a result of a Coursera course? Coursera tracks every single event on the site: What students access, when and how often, if they skip through a lecture (perhaps the professor is boring?), where they pause or rewind, which answers they submit to a quiz, do they post a question in a forum, who looks at and responds to the question, etc. When (for example) 50,000 people participate in a course, the data can offer powerful insights. Koller
showed an example of a question in one MOOC which 2,000 people answered incorrectly. In a class of 100, she noted, if two people answer a question incorrectly, no one notices. In a course of 100,000 students, if the same percentage (2%) answer incorrectly, it *is* noticed! The instructor can then examine the question and try to figure out why students are getting it wrong -- and make changes if it is seen to be prudent to do so. When students get a wrong answer, they can receive a 'sorry you're wrong, here might be why, and here's how you might be able to correct your mistake' screen in response, an example of a sort of personalized feedback.

Coursera and their partner universities can also gain insights into pedagogy. They can, for example, show two lectures to students -- one with a professor's face in front of a PowerPoint presentation, the other one with just the presentation -- and test to see if anything different happens as a result. This sort of A/B testing is common on the Internet (Google does it thousands of times a year with its search results), but it hasn't been possible and practical in the classroom because classrooms don't have the necessary scale. Where A/B tests are run in classrooms, it can take years for the study to be written up and appear in a journal, and the results thus can't be fed back into course design very quickly. In this particular example, Koller noted that they don't know which option worked 'better', seeing the professor's face or not, because they stopped the experiment halfway through. Students were complaining that they couldn't see the instructor's face, so they simply added it back in. The students, then, felt that it made an impact -- Coursera doesn't know if it actually did. (If you are asking yourself: How did some students know that other students were seeing the professors face, and they weren't? The answer: They were communicating in the online forum for the course!) In another experiment, they sent out emails to students to remind them there was an upcoming deadline for completing a problem set. Only one of the eight versions of the email was shown increased retention -- the other 7 actually decreased retention! (Follow-on research suggests that, in the worst case email, retention decreased because students felt nagged.)

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**Improving learning outcomes**

Koller she mentioned Bloom's seminal paper on "The 2 Sigma Problem", which investigates differences in achievement as a result of instruction via lecture, mastery learning or individual tutoring, with each instruction method achieving significantly improved results. Bloom noted that mastery learning and individual tutoring don't scale. Or do they? In normal face-to-face circumstances, maybe not ... but what if everyone has a tablet or a smart phone? In such case a case, you can potentially scale mastery learning, Coursera believes. Koller then noted that the technology to scale individual tutoring isn't here ... yet.

Koller then related two quotes about education. The first was from Edwin Emery Slossom [she attributed it to mark twain in her TED Talk]: "College is a place where a professor's lecture notes got straight to the students' lecture notes, without passing through the brains of either." (Whenever I hear this quote, I am immediately reminded me of a scene from the 1980s American film comedy Back
To School, where a professor just uses a cassette tape player to broadcast his lecture to the empty lecture hall ... filled with cassette tape recorders of students recording the lecture.) The second was from Plutarch: "The mind is not a vessel that needs filling, but wood that needs igniting'. Koller then proposed that we should do different things in the classroom. We shouldn't try to convey information there (that can happen outside of class), but rather to use such time to engage with students. This is, of course, famously known as 'flipping the classroom'.

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"Blue Ocean"
Wrapping up her talk, Koller mentioned a case study of Coursera by Wharton's Christian Terwiesch which suggests that the service deliver model of MOOCs likes Coursera offer 'efficient frontier', whereby we can 'cash-in' by holding faculty productivity constant and achieving better learning, or by holding learning constant and saving money as a result of increased faculty efficiency. (If you want to follow his argument, watch him explain it on YouTube.) Terwiesch also argues that MOOCs should pursue a 'blue ocean strategy' by seeking to create new demand in an uncontested market space (a "blue ocean") rather than compete head-to-head with incumbent suppliers in an existing industry. In other words: MOOCs could be used not to compete with offerings from traditional universities, but rather work to open new markets in education that existing providers can not tap. This strategy coincides nicely with Coursera's goal of 'education for everyone'.

Koller noted that 80% of students taking courses offered through Coursera already have university college degrees, half of them at the master's level. While she expects that this mix will change as more lower level, introductory courses are offered through the Coursera platform, this suggests how MOOCs can enable lifelong learning. She concluded that students who take courses offered through Coursera come from all over the world. Only about one-third of students are from North America; a slightly lower proportion come from Europe. This suggests that MOOCs can play a real role in offering access to education to those who need it the most, she said, pointing the way to an opportunity to change education from a privilege for a few to a human right for all. (If you've seen Koller's TED Talk you'll have heard her passionate comments in regard already -- and if you haven't and have read this far, you really should -- it's about one hour shorter than the video of her talk at the World Bank in February.)

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I have offered these notes with minimal editorial intervention. I hope I've done an accurate job of conveying some of the key information and arguments offered in Koller's talk. (If not, let please correct me in the comments section below.)

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This is the first of three EduTech blog posts about that will be published in quick succession on the topic of MOOCs. Making Sense of MOOCs -- A Reading List and Missing Perspectives on MOOCs will follow.
You might also be interested in a related online discussion that has been happening over at the EduTech Debate site.
A few years ago I participated in a fascinating online course. I had earlier read a thought-provoking article called *Connectivism: A Learning Theory for the Digital Age* by a Canadian academic named George Siemens, and was intrigued to stumble across references to a related online discussion that was taking place, led by Professor Siemens and another Canadian researcher named Stephen Downes. OK, to be honest, I am not sure that I actually participated in the course (and I wasn't actually sure if it was a course in the traditional sense ... although it was certainly a community), given that my 'participation' consisted of a haphazard scanning of emails and RSS feeds being generated by people whose were much more engaged in the effort than I was. That said, both the content and approach piqued my curiosity, and I spent enough time browsing through related materials that I was able to tell my boss with a straight face that I was doing some 'online learning'.

I saw Siemens speak at eLearning Africa, was suitably impressed, and later tried to figure out a way to bring him to the World Bank to talk about his work as part a new series we were trying to put together on 'eduradicals'. I was particularly interested in learning more about, and exposing colleagues to, the concept of a 'massive open online course', which (it turns out) was the label that was being applied to what Siemens and Downes (and a few thousand other people) had been engaged in. In this I rather spectacularly failed, as most people with whom I spoke thought that the whole enterprise I was trying to describe, while conceptually quite interesting, was unlikely to be of practical interest or relevance in the near term to the policymakers with whom we were engaged in developing countries. My failure in this instance was, I believe, more a consequence of my inability to articulate to my colleagues in a convincing way just what exactly the possibilities were of this 'connectivist' learning theory and of one a 'model' by which this theory might be explored and put into practice -- which was one of the first (and possibly the very first) MOOCs.

(It is perhaps for reasons such as this that I am regularly asked to be involved in activities trying to understand 'failures' of various sorts.)
MOOCs, as most everyone (including I) now knows, are the new new thing in higher education, an approach being hyped in certain quarters (like the MIT Technology Review) as 'The Most Important Education Technology in 200 Years'.

Inquiries related to MOOCs are the number one topic of unsolicited emails and phone calls I receive from consultants these days. Last year I received not one internal request from World Bank staff for information or comments on MOOCs -- now they come every week. As an institution, we are, if not exactly jumping in with both feet, at least dipping our toes into these new waters, through things like support for a pilot initiative in Africa and, one expects, soon to offer some of our traditional World Bank training courses for policymakers via one or more of the big MOOC platforms.

Keeping up with announcements related to new activities, partnerships and tools being explored by MOOC providers like Coursera, Udacity and edX is very difficult. Did you know about the Futurelearn, the MOOC alliance out of the UK? Have you heard the latest MOOC news out of Germany? You may know about ALISON online training platform, like I did, but not know that some actually consider it a contender for the 'first MOOC' crown (I didn't). According to some (quite elastic) definitions, even things like the Khan Academy qualify as a sort-of-MOOC (while I like the Khan Academy, I find labeling it a MOOC is stretching the definition just a bit too far). Did you know that some of the tools behind one of the leading MOOC platforms are now freely available for use by others? Did you see that one way that MOOC providers are attempting to be able to provide feedback to thousands of students at once is to automate the grading process?

While most of my work at the World Bank related to the use of information and communication technologies in the education sector is focused at the primary and secondary level, I know enough about higher education to know that it changes very sloooowly. In contrast, this whole MOOC thing seems to be happening at lightspeed. Looking for a 'cheat sheet' on how to get up to speed, and stay current with, news, opinions and insights related to this promising phenomenon called 'MOOCs'? The following resources might help.

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**A Ten Point Reading List to Help You Make Sense of MOOCs**

1. The Wikipedia entry on MOOCs is quite useful and, as in many other instances, a good place to start. It contains lots of information and links -- but not too much or too many. As Wikipedia explains,

   A massive open online course (MOOC) is an online course aiming at large-scale interactive participation and open access via the web. In addition to traditional course materials such as videos, readings, and problem sets, MOOCs provide interactive user forums that help build a community for the
students, professors, and TAs. MOOCs are a recent development in distance education and often use open educational resources. Typically they do not offer academic credit or charge tuition fees. Only about 10% of the tens of thousands of students who may sign up complete the course.

MOOCs originated about 2008 within the open educational resources (or OER) movement. Many of the original courses were based on connectivist theory, emphasizing that learning and knowledge emerge from a network of connections. 2012 became "the year of the MOOC" as several well-financed providers, associated with top universities, emerged, including Coursera, Udacity, and edX.

2. The EDUCAUSE library entry on MOOC is another good starting point, and a great source of a limited number of informative, curated links about MOOCs. 7 Things You Should Know About MOOCs [pdf] is a very useful primer. Not surprisingly, the Chronicle of Higher Education also maintains an excellent curated set of resources outlining What You Need to Know About MOOCs.

3. The mooc.ca news aggregator is provided by Stephen Downes and George Siemens -- the two guys behind what is popularly considered to be the first MOOC by most people, and who have remained as in-the-know as anyone about what is happening in the MOOC space.

4. For a very quick overview of What is a MOOC?, watch this short YouTube video from Dave Cormier. At this point, you'll be perhaps ready to absorb an historical perspective of the sort to be found in this podcast from Steve Hargadon which features some of the leading practitioners and observers. George Siemens (again!) provides some very useful historical perspective as well. It was the Wired Magazine article on the efforts of Sebastian Thrun and Peter Norvig at Stanford (which later led to the formation of Udacity) that probably did more to thrust MOOCs onto the radar screen of many people (and many journalists). And if that article didn't do it, the very popular TED Talk from Coursera founder Daphne Koller did.

5. No primer on MOOCs would be complete without dipping into some of the hype. The New York Times declared 2012 the Year of the MOOC. Three opinion pieces by that newspaper's star columnist Thomas Friedman -- Come the Revolution, Revolution Hits the Universities and The Professors' Big Stage -- are good (and influential) examples of the excitement that MOOCs engender among certain folks. (I've already mentioned the MIT Technology Review article at the top of this post.)

6. For a more sober, dispassionate assessment, read Sir John Daniel's Making Sense of MOOCs: Musings in a Maze of Myth, Paradox and Possibility [pdf]. Most of the leading sources of information on MOOCs are, in one way or another, practitioners as well. Sir John looks at the phenomenon from the vantage point of someone who has led open and distance learning efforts using new technologies for decades (he used to be in charge of the Commonwealth of Learning, and before that, UNESCO's education work -- and lots of other things) and so may be seen by
some as a more neutral observer.

7. One of the most insightful analyses of MOOCs can be found in a report from Moody's Invester's Service, *Shifting Ground: Technology Begins to Alter Centuries-Old Business Model for Universities* [pdf]. Universities raise a lot of money in bond markets, and as one of the leading rating agencies, Moody's is well placed to provide interesting insights into the potential impact of MOOCs on the financial situations of North American universities as a result. If you can get your hands on a copy (it is floating around the Internet), a recent report from Austrade, the Australian Trade Commission, *More than MOOCs: Opportunities arising from disruptive technologies in education* might make for very interesting reading as well. (If not, here's a [related blog post](#) from The Australian.)

8. From the perspective of a university considering partnering with one of the large MOOC providers, have a look at an analysis by InsideHigherEd of a [leaked Coursera contract](#). InsideHigherEd's coverage of MOOC-related news is in general very good, and following the MOOC-related news and opinions available on InsideHigherEd will still keep you quite well informed.

9. Some of proposals crossing my desk with the 'MOOC' tag attached are really just existing distance learning initiatives wrapped up in new clothes. Background on lessons from technology use in education more generally, especially as relate to online learning and virtual education, might be worth investigating. This short article by the head of Penn State's World Campus, *MOOCs Are No Education Panacea, but Here's What Can Make Them Work*, points to some of them (as would regular reading of the [World Bank EduTech blog](#), I might immodestly suggest.)

10. One important challenge for MOOCs relates to [accreditation](#). (Recent news that the American Council on Education have started to [endorse MOOCs for credit](#) points to some progress in this regard.) While you're reading about such things, it might be worthwhile to read up on [digital badges](#), which will probably receive increasing attention as MOOCs develop over time. Another, at some point presumably existential, challenge will relate to sustainable business models. Simply put: *What are they?* The *Wall Street Journal* looked at this topic recently; one suspects many additional potential business models will be discussed and explored in the coming months and years as MOOC providers 'pivot' in the way that young technology firms and initiatives often do.

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OK, I'll stop there. Familiarize yourself with these resources and you may quickly become, for better or for worse, the 'go-to person on MOOCs' in your organization. (With things changing so quickly in this area, I do note that, in the valley of the blind, the one-eyed man is king.) You'll still only be seeing part of the emerging picture, however. You may have noticed that almost all of these resources noted above are from North America. Interspersed among these articles and reports will be references to the potentially transformative power of MOOCs on education in middle and low income countries (and a few compelling anecdotes about
experiences of individual learners in such places who have participated in a MOOC). What is glaringly absent from the above list are perspectives from developing countries. This will be subject of the next EduTech post.

This is the second of three EduTech blog posts that will be published in quick succession on the topic of MOOCs. MOOCs in Africa was the first, Missing Perspectives on MOOCs will follow.

You might also be interested in a related online discussion that has been happening over at the EduTech Debate site.

Note: The public domain image of a "book-lover cow" from the CowParade used at the top of this blog post ("reading about MOOCs") comes via Wikimedia Commons from user Miaow Miaow.
Excited discussions about 'MOOCs' are reaching a fever pitch in some quarters. Separating the hope from the hype related to the phenomenon known as Massive Open Online Courses, in which tens, and in some cases hundreds of thousands of students from around the world participate in (or at least register for) the same university course over the Internet, is not an easy task. There is, to be sure, much here to be potentially excited about.

That said, most of news (and hype) is coming out of North America, and the prominent perspectives on MOOCs are, to a great extent, coming out of North America as well. While voices from Silicon Valley and elite educational institutions in the United States (amplified by prominent media personalities) have been the loudest to date, a fair component of the 'hope' surrounding MOOCs has to do with their potential to improve educational opportunities for students in so-called 'developing countries'.

Trying to keep up with MOOC-related announcements and news stories, let alone all of the opinions on them and speculations on their future, could be a full time job. (I suspect it probably is a full time job for some people, actually. If you are interested in this sort of thing but don't have that much time, you may be interested in a recent EduTech post on Making Sense of MOOCs -- A Reading List.) Wander through this din of excitement, however, and you discover pockets of relative silence.

*What are some of the emerging perspectives of key groups in developing countries related to MOOCs?*

One specific type of developing country perspective is being heard, and indeed prominently described (usually by anecdote by people in North America): that of a student in a developing country (Pakistan, for example, or Indonesia) who participates in a MOOC, gaining exposure to learning opportunities and connections with other learners around the world in ways (presumably) not otherwise available to her. While anecdotes of this sort have a special place and established history in the selling of new technologies and technology-enabled products and services, this doesn't mean that they don't offer real and tangible examples of how the life of an
individual can be impacted in a positive, potentially transformative way as a result of interactions enabled by technologies in ways that are new and innovative.

But aren't there more perspectives from middle and low income countries worth considering?

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Here at the World Bank, we are, all of a sudden, getting lots (!) of questions about MOOCs these days from our partners in ministries of education in middle and low income countries, and from some of the institutions and groups with which they typically work.

Questions like:

1. **What should our policy on MOOCs be? (Do we need one?)**
   (In some of these cases, one suspects that word has come down from the boss who, after coming across an article about MOOCs online, or seeing a TED talk, is convinced that 'MOOCs are the future', and the future is coming fast!)

2. **How might MOOCs represent a threat to us ... or an opportunity?**
   (Some people are already thinking in existential terms, others in ways strategic.)

3. **We are thinking of partnering with [insert name of MOOC provider here]: What should we know?**

(These sorts of questions are practical -- and immediate. We do note that lots of groups are sniffing around this space, some looking for institutions of higher education in a developing country with whom they themselves can jump into the deep end of the pool, and others hoping to serve in a sort of middleman role, encouraging others to jump.)

To be honest, we are not quite sure how to respond to these sorts of queries.

(Some quick and perhaps unsatisfying answers:
1. It depends ... what do you want to accomplish?
2. Potentially yes, on both counts.
3. We recommend you consider taking a deep breath and slowing down. Don't assume you will have 'missed the boat' if you don't jump into a MOOC-related partnership right now. You may want to consider getting your feet wet in some small at some point, however -- or learning from those who are.)

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Whether or not a ministry of education or a university in a middle or low income country, should have a 'MOOC policy' today, some time spent thinking about some of the fundamental issues that the emergence of MOOCs raise, and make more acute, might be time well invested.
Long-predicted by some, technological advances are taking us closer to a place where it might be possible to 'un-bundle' many of the types of things that we have for quite some time associated with physical enrolment and study at a single university. Things like:

- accessing specific learning materials (whether in the form of text or lectures or libraries, as such things are digitized it is easier and easier for the resulting bits to be beamed quickly around the corner, or around the world, so that what was once scarce -- and available only 'on campus' -- increasing becomes a commodity -- available to all over the Internet);
- joining a community of learners with similar interests;
- the ability to have your work, and progress in this work, 'graded' by an expert;
- the possibility of having individual lessons linked together into a course, which can then be part of a larger academic concentration or specialization (one's 'major', to use the North American term); and
- having the completion of a given sequence of courses acknowledged or certified in some way, especially through the awarding of a degree.

Are MOOCs a mechanism to catalyze such an un-bundling?

Or are they just the latest in a long line of innovative approaches to education that emerged over the years to tantalize us with such great promise, only to in the end deliver a little less than what we had hoped for?

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Over the past two decades, developments in industries as different as music and travel have demonstrated the potential for technology to help disintermediate and disrupt established ways of doing things. It's not only MOOCs which have highlighted the potential for the unbundling of these constituent components of the typical university experience, of course -- online learning, distance education offerings of various sorts, and so-called virtual universities have demonstrated how such things might be possible in education for many years. (Viewed from a slightly different angle, the homeschooling movement in the United States is another example of how technologies can enable the schooling experience to be 'un-bundled'.) But the MOOC phenomenon has emerged at a time when new, lower-cost, networked technologies -- increasingly widely dispersed among different populations around the world, and thus more accessible -- are demonstrating how it might be easier than ever before to do something tangible in response to long-standing dissatisfactions of various sorts with the current educational status quo at the higher education level.

*Easier than ever before, perhaps, but far from easy.*

*Desirable?* That probably depends on your perspective.

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Some critics may lament that MOOCs represent a return to the 'sage on the stage' mentality that ICT-enabled learning practices were meant to make obsolete.
Other critics may see in MOOCs yet another wave in cultural imperialism from the 'North' and the 'West' crashing across borders, washing over (or possibly washing out) local educational institutions, cultural norms and educational traditions.

Still other critics fear the institution of a markedly two-tier system of global higher education, with a small number of elites able to participate in education the 'old-fashioned way' in small, intimate, face-to-face groups in close physical contact with their professors, while the vast majority of students, especially those in developing countries, have to make do with participating in a watered down, inferior educational experience delivered through MOOCs.

(I am not saying I agree, or disagree, with such critics, or that these are the only sorts of criticisms out there, or that these are the most 'important' types of criticisms; rather, I am just noting that these sorts of criticisms are representative of some of the types of comments we are hearing.)

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Here are some perspectives from middle and low income countries that would enrich the current debate about MOOCs and make it more global:

- from a university leader
- from a senior official in ministry of education
- from the head of a national accreditation agency or board

Analyses from the perspectives of such people and institutions, considering (for example) the strengths and weaknesses of their current organizations, and the educational systems in which their organizations play important roles, as well as the opportunities and threats presented by the emergence of MOOCs (and related phenomena) to their current ways of operating, might be quite illuminating.

And following that, perhaps, a consideration of practical options going forward, and the resources that may be needed to be secured (or re-assigned) in order to realize these options, might shed yet more light on approaches going forward.

(Along the way, some sustainable related business models might be worth considering too!)

Many more perspectives worth investigating than just these, of course, but they might represent three good places to start. (Poke around the Internet enough, and you can find some blog posts from learners in developing countries commenting their personal experiences with MOOCs.) Including some different voices, from different places, in the conversations and debates about MOOCs would enrich our collective ability to separate some of the hope from the hype when planning for investments in higher education systems and institutions in the years ahead.

Like the providers themselves, public discussions around MOOCs have tended to represent viewpoints and interests of elite institutions in rich, industrialized countries (notably the United States) -- with a presumption in many cases that such viewpoints and interests are shared by those in other places.
This is the third of three recent posts about MOOCs on the EduTech blog. The others are MOOCs in Africa and Making Sense of MOOCs -- A Reading List.

You might also be interested in a related online discussion that has been happening over at the EduTech Debate site.

Note: The image used at the top of this blog post of two cows peaking through a shed ("some different perspectives, perhaps?") is from Andy Wright. Originally uploaded to Flickr, it comes via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution 2.0 Generic license.
Debating MOOCs
by Michael Trucano
#11: originally published on Tuesday, 23 April 2013

Three recent posts on MOOCs (MOOCs in Africa, Making Sense of MOOCs -- A Reading List & Missing Perspectives on MOOCs -- Views from developing countries) have generated a large amount of traffic and 'buzz' over the past week on the EduTech blog, and so we thought we'd interrupt our normal Friday publishing schedule to bring you one more.

Over the past month, the EduTech Debate site has been featuring posts and comments from authors exploring various issues and opportunities presented by the phenomenon of so-called Massive Online Open Courses. While perhaps it hasn't been a 'debate' per se, it has featured responses and reactions from the authors to each other's posts, and I thought I'd quickly highlight the conversation that has been occurring over there, in case you may have missed it and doing so might be useful.

(I also do this in the hope that some of you will click over and have a look at the posts in their entirety. The EduTech Debate was conceived when I worked over on the infoDev program as a way to feature voices from outside the World Bank on emerging topics of interest in ways not often possible on the World Bank or infoDev sites. Originally supported by infoDev and UNESCO, it has now been officially 'spun out', but thematic linkages remain.)

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The April EduTech Debate began with a post by Wayan Vota, which asked, Are Massive Open Online Courses Massive Opportunity or Massive Hype? as a way to kick off the month's online conversation. Wayan cited a result from a recent Chronicle of Higher Education survey of professors who have themselves offered a MOOC; 79% of them said that, considering what they learned as a result of their participation, 'MOOCs are worth the hype'. Given that most all (if not all) of these respondents were from OECD countries (and most likely predominantly from the United States), Wayan then asked if the MOOC hype is worth it in the context of developing countries, is indeed MOOCs present a possible "paradigm shift" -- or if they will "reach a peak of inflated expectations before dropping into a trough of disillusionment already filled with other edu-fads"? (In a related comment, Ed Gaible expresses a concern that "MOOCs create a "winner take all" competition in
higher education that will likely undercut the development of capacity in higher education in non-elite universities.")

Roxana Bassi then followed up by exploring *3 Ways MOOCs Unleash the Power of Massive International Attendance*. She is quite interested in what "massive" might mean. Among other things, she is interested in the potential to learn from the potential "data bonanza" offered by MOOCs, noting that, "because for the first time we are having thousands of people with different profiles accessing the same content at the same time, the opportunity for doing a statistical analysis of the population’s behavior is fantastic." She also highlights the potential that "the collective intelligence of the worldwide audience can question the course content and turn it into truly globalized experience."

Next, Kentaro Toyama offered a decidedly contrary note with his post, *MOOCs Will Come and Mostly Go Like Other EduTech Fads*. Kentaro identifies three types of MOOCs. Type #1 describes a situation where, for the most part, a MOOC consists largely of content put online, an exercise that he sees as having minimal impact on education worldwide. Type #3 describes essentially what are 'traditional' online courses -- in other words, "not really a MOOC at all". The impact of such things, he feels will be commensurate with the strength and capacity of the institution offering -- but "never quite be as good as the real thing". In between is a second type of MOOC. He feels that this is where the "most interesting experiments will happen", but that, over time, they will evolve into something that more closely approximates Type #1 or Type #3. He concludes with a strong message that "MOOCS will come and mostly go ... and most students won’t learn that much more or less than they learn today ... unless, of course, we make the hard social and political decisions to pay for excellent adult guidance in education for everyone." [emphasis added] As Kentaro's writings and speeches typically do, this post (which originally appeared in a slightly different version as *Kooks and MOOCs* on the blog of the ICT4D Jester) generated much interest and divided opinions.

Oscar Becerra, who was one of the leading figures behind the OLPC project in Peru, then explored the *The One Laptop Per Child Correlation With Massive Open Online Courses*. Oscar feels that many critics are missing something that is truly important about MOOCs: their ability to reach "the millions of students around the world for whom Higher Education is non-existent or unreachable". The real target groups for MOOCs, he writes, "are currently 'non-consumers' of education". He cites Clayton Christenson's research, which finds that "every industry faced with disruptive innovation will eventually be overtaken by those who, in the beginning, seemed low quality available only to non-consumers". He concludes with a plea not to "deprive the ones at the bottom to get at least something that is good enough".

Ismael Peña-López of the Open University of Catalonia (and author of the popular *ICT4D Blog*) then proceeds to "mostly agree" with Becerra, but notes that a few things are missing that merit further discussion. *The Importance of Context and Human Factor in MOOC Education* notes that there are really two types of MOOCs: 'connectivist MOOCs' (cMOOCs) and 'non-connectivist MOOCs' (xMOOCs). xMOOCs, he feels, are largely just a "channel of content distribution", whereas connectivist
MOOCs are empowering, and "education is about empowerment". Ismael then makes a number of subtle points that I won't attempt to summarize (read the post for them!), but concludes by stating that "MOOCs can be compared to the OLPC in the sense that they both provide good tools to "non-users" of education, but I would refrain myself to say that they both, by themselves, provide rough alternatives to the educational system. Not by themselves."

In Learn Experientially and Connect Globally with MOOCs, Randy Fisher of the ICT Council in Ottawa (Canada), notes the seminal influence of work done by George Siemens and Stephen Downes with their Connectivism MOOC, and then shares lessons from his work with the Learning4Content project from WikiEducator.org and Commonwealth of Learning, which was "billed as the world’s largest free wiki skills training project utilizing MOOC-style online courses". He writes that there is "considerable debate about the merit and value of MOOCs" and that "MOOCs are in their infancy". Echoing Roxana, he states that MOOCs "offer a tremendous opportunity to learn and share knowledge ... [and to] increase quality, as the offering institution/NGO has access to thousands of potential beta testers to crowdsource improvements and obtain feedback for future iterations." MOOCs, Randy seems to say by way of some interesting examples, are about "imagination, ingenuity and experimentation" -- and what can be learned as a result [or, perhaps more importantly, along the way].

Writing from Queensland (Australia), Jonathan Nadler then concludes the April EduTech Debate by asking, Will MOOC Technology Break the Education Cartel? Jonathan focuses on the potentially disruptive nature of MOOCs, and talks about how new technologies, and the applications of such technologies, have disrupted other industries. He concludes by stating that "what is emerging will be courses and schools based on interest not just on the luck of the draw method we currently have that's decided by where you live or postcode, i.e. where you happen to live."

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OK, that's my quick attempt to summarize some of the interesting arguments being advanced this month over on the EduTech Debate site. You are encouraged to go check things out there yourself -- I have no doubt oversimplified things in some instances, but hopefully you are intrigued enough to click over and have a look at what the authors have to say in greater detail.

This will be the last EduTech blog post on MOOCs for some time (I promise – or at least hope). It will most certainly be the last one to feature pictures of cows for the foreseeable future. On Friday we'll kick off a series of three posts looking at recent regional efforts from different organizations to survey, catalog and assess ICT use in education in different parts of the world: Latin America; Central & Western Asia; and Europe.

Note: The image used at the top of this blog post of two cows in the French countryside ("MOOOOOOOOCs") is © Guillaume Piolle / CC-BY-3.0. It comes via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution 3.0 Unported license.
Technology use in schools at reasonably large scale began in many OECD countries in earnest in the 1980s and then accelerated greatly in the 1990s, as the Internet and falling hardware prices helped convince education policymakers that the time was right to make large investments in ICTs. In most middle and low income countries, these processes began a little later, and have (until recently) proceeded more slowly. As a result, it was only about ten years ago, as education systems began to adopt and use ICTs in significant amounts (or planned to do so), that efforts to catalog and analyze what was happening in these sets of countries began in earnest. UNESCO-Bangkok's *Meta-survey on the Use of Technologies in Education in Asia and the Pacific*, published in 2003, was the first notable effort in this regard. A trio of subsequent efforts supported by infoDev (*Africa* in 2007; the *Caribbean* in 2009; and *South Asia* in 2010) helped to map out for the first time what was happening in other regions of the world related to the use of ICTs in education. While the information in such regional reports can rather quickly become dated in some cases, given the pace of technological change, they still provide useful points of departure for further inquiry. In some other parts of the world, even less has been published and made available for global audiences about how ICTs are being used in education.

Information about developments in many of the countries of the Soviet Union, for example, has not, for the most part, been widely disseminated outside the region (indeed, for many within the region as well!). The Moscow-based UNESCO Institute for Information Technologies in Education (IITE) has been perhaps the best 'one-stop shop' for information about ICT use in the region. Recent work by the Asian Development Bank has gone much further to help to fill in one of the most apparent 'blind spots' in our collective global understanding of how countries are using ICTs to help meet a variety of objectives within their formal education systems. *ICT in Education in Central and West Asia* [executive summary, PDF] summarizes research conducted over five years (2006-2011) in Azerbaijan, Kazakhstan, the Kyrgyz Republic, Tajikistan, and Uzbekistan, with shorter studies on Afghanistan, Armenia, Georgia, and Pakistan.

Some key findings from this work:
• While the importance of ICT in education has been recognized widely, it is still in its infancy in most of the region and its role and impact have yet to be fully determined or realized.

• While all the participating countries consider effective teacher training in ICT skills to be among the key determining factors in its effective ICT use, most are not providing sufficient training to use ICT to best effect.

• There is an urgent need for governments to adequately fund school ICT operational costs.

Interesting conclusions, you might say to yourself, but not all that different in what has been happening in many places in the world. Especially so, when you consider that the report identifies "an emphasis in most systems on hardware provision — amid the unfortunate but widespread assumption that provision of the hardware by itself is the solution to a range of educational problems". (Longtime readers of the EduTech blog may here echoes of what we have more generally labeled the 'classic example of worst practice' in ICT use in education: Dump hardware in schools, hope for magic to happen.)

That said, and like other regions, there is a wide range of intention, ambition, and implementation across this set of countries. Compare, for example, Kazakhstan, where all schools are connected to the Internet, interactive whiteboards are in common use, and lots of digital learning materials are available, with a place like Tajikistan, where ICT use in education is still in the early stages, with targeted investments at a few grade levels -- primarily in support of an 'informatics' (i.e. computer literacy) curriculum. (Side note: Reading the report, one gets the impression that the specter of 'informatics' has cast a heavy and often determining shadow over investments in computers in schools across the region, which in many cases have been closely linked with efforts to expand access to informatics courses -- typically within the confines of school computer labs. This is, to my knowledge, not unlike how things have developed in other regions of the world, but the impression this survey leaves on me is that this influence is comparatively stronger in this region than in most others.) Technical support and maintenance is a problem in many places: Almost a third of computers in Kyrghyz schools, for example, weren't working when survey work there took place.

The ADB study finds "a remarkable unanimity in the identified constraints on ICT development and effective use in basic education", with challenges related 'divides' of various sorts (between rich and poor, for example, between urban and rural); inadequate school infrastructure (including power supplies) and gaps in so-called last mile connectivity; insufficient teacher training (compounded by lack of sufficient attention to how to motivate and support older teachers in their use of new technologies); and lack of digital materials in local languages. Not surprisingly, funding is often stretched quite thin. Core components of the educational landscape (curriculum, assessment mechanisms, etc.) have remained largely the same, and so have not been modified to take advantage of some of the affordances offered by the introduction of ICTs. Studies on the impact and effectiveness of ICT use in
education remain few and far between, in part due to a lack of adequate mechanisms and funding to support such activities.

For most people not working in these places, I suspect the good (and short) executive summary [pdf] will provide a sufficient general overview of what has been happening.

Those with more detailed interests -- especially about country-level activities -- are directed to the full (337 page) report, *ICT in Education in Central and West Asia: A Work in Progress*, which (obviously, given its length) goes into much greater detail. [Here's the link to where you can, very slowly, download the PDF.]

In addition to more substantive analyses of specific issues across countries, drawing on lessons from other parts of the world in certain circumstances, the publication includes a set of 'ICT in Education Country Reports' for Azerbaijan; Kazakhstan; the Kyrgyz Republic; Tajikistan; and Uzbekistan, as well as a shorter series of 'ICT Rapid Assessments' for Afghanistan; Armenia; Georgia; and Pakistan. Here you can find useful updates of many of the ICT/education country reports that appeared in the original UNESCO 'meta-survey' of 2003, as well as complements to the country reports for Afghanistan and Pakistan which are available in the infoDev regional survey of South Asia.

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As with other regional surveys of this sort, some of the most interesting stuff is in the details of the individual country reports. Just one quick example: I was interested (and heartened) to see the apparent priority that Kazakhstan has given to ICT use to support the education of students with special educational needs. This is an area where the potential for ICT use to help meet goals that call for 'learning for all' is quite clear and compelling around the world and where (unlike many other aspects of the ICT use in education) there is a compelling evidence base to support investments that can make tangible, measurable impacts on student outcomes. This is not to say that Kazakhstan would appear to be a 'model' in this regard -- the report notes that "computer/student ratio in special needs schools was 1:22 in 2010, which was only slightly less than the general secondary figure of 1:18". Plausible arguments could be advanced that goals of parity in such things are only a starting point, given the outsized impact that ICTs can have on educational opportunities for special needs students. Rather, it is to note that Kazakhstan would appear to be doing more in this area than many of its neighbors -- and similar countries around the world (even if 'more' is still felt by some to be 'insufficient'). Might there be lessons in this regard from Kazakhstan for other countries around the world who are beginning to place greater priority on special needs education, and the potential role that ICT can play? Perhaps. A close reading of the country reports may unearth dozens of other examples where opportunities for learning and knowledge sharing around specific topics or issues might be worth exploring.

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The Asian Development Bank's work to survey ICT use in education in Central and West Asia helps fill an important gap in our collective global knowledgebase. For
those interested in tracking developments across the globe in this area, it is an invaluable resource, pointing to issues and activities, initiatives and policies of potential relevance to scores of other middle and low income countries. For those working in, or considering working in, these specific countries, it contains a wealth of information and will most likely remain, for the immediate future, the best source of detailed data and insights about how countries in this diverse region are exploring the use of new technologies to help meet their educational and developmental objectives.

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Note: You may also be interested in an earlier post on the EduTech blog: Assessing education with computers in Georgia.

This is the first of three blog posts highlighting regional survey efforts of ICT use in education around the world. Next up: a post on Europe, followed by one on Latin America.

Note: The image used at the top of this blog post of a student in Kazakhstan doing some work on an interactive whiteboard under the watchful guidance of her teacher ("A is for Astana ") comes from the Wikipedian Kryukov via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license.
One consistent theme that I hear quite often from policymakers with an interest in, and/or responsibility for, the use of ICTs in their country's education system is that they want to 'learn from the best'. Often times, 'best' is used in ways that are synonymous with 'most advanced', and 'most advanced' essentially is meant to describe places that have 'lots of technology'. Conventional wisdom in many other parts of the world holds that, if you want to 'learn from the best', you would do well to look at what is happening in places like the United States, Canada, Australia, the United Kingdom, South Korea and Singapore. (Great internal 'digital divides' of various sorts persist within some of these places, of course, but such inconvenient truths challenge generalizations of these sorts in ways that are, well, inconvenient.) Policymakers 'in the know' broaden their frame of reference a bit, taking in a wider set of countries, like those in Scandinavia, as well as some middle income countries like Malaysia and Uruguay that also have 'lots of technology' in their schools. Whether or not these are indeed the 'best' places to look for salient examples of relevance to the particular contexts at hand in other countries is of course a matter of some debate (and indeed, the concept of 'best' is highly problematic -- although that of 'worst' is perhaps less so), there is no question that these aren't the only countries with lots of ICTs in place (if not always in use) in their education systems.

What do we know about what is happening across Europe related to the use of ICTs in schools?

The recently released Survey of Schools: ICT in Education Benchmarking Access, Use and Attitudes to Technology in Europe’s Schools provides a treasure trove of data for those seeking answers to this question. Produced by the European Schoolnet in partnership with the University of Liège in Belgium, with funding from the European Commission, the publication features results from the first Europe-wide survey of this sort across the continent in six years:
Survey of Schools: ICT in Education
Benchmarking Access, Use and Attitudes to Technology in Europe's Schools

Final Study Report
February 2013

Based on over 190,000 responses from students, teachers and head teachers collected and analysed during the school year 2011-12, the Survey of Schools: ICT in Education provides detailed, up-to-date and reliable benchmarking of Information and Communication Technologies in school level education across Europe, painting a picture of educational technology in schools: from infrastructure provision to use, confidence and attitudes.

The Survey was commissioned in 2011 by the European Commission to benchmark access, use and attitudes to ICT in schools in 31 countries (EU27, Croatia, Iceland, Norway and Turkey).

It is the first Europe-wide exercise of this type for six years, following the eEurope 2002 and eEurope 2005 surveys. It is the first to be conducted online and the first to include students directly. Work on the survey took place between January 2011 and November 2012, with data collection in autumn 2011.

In four countries (Germany, Iceland, Netherlands and the United Kingdom) the response rate was insufficient, making reliable analysis of the data impossible; therefore the findings in this report are based on data from 27 countries.

Downloads:
- download the entire report, as well as country reports, through this page
- download the data sets, technical reports, survey questionnaires and codebooks through this page (scroll down to the section called "ESSIE SURVEY about ICT in Education")
If you're looking for a graph or bar chart describing some aspect of ICT use in European schools, this new publication will most likely be your go-to resource for many years to come! The PDF file for the 163-page main report (which also contains the individual country reports) weighs in at a whopping 17.23 MB -- a file size due in no small part to the fact that it features 274 graphs and charts (almost all of them are bar charts -- pie chart devotees may be disappointed -- and one shouldn’t be too surprised to see some of these reproduced in hundreds, if not thousands, of PowerPoint presentations in the coming years). All of the materials produced as part of the survey process, including the data sets themselves, and the questionnaires used to help build them, are available for free download. For those engaged in survey activities related to ICT use in education at the national, sub-national or international level, this work should be considered required reading. Its conceptual framework, methodology, key questions, definitions and indicators are laid out clearly. If you don't want to read the entire report yourself and are having trouble downloading the entire document so that you can just skim its executive summary, you may wish instead to read a related overview article that was recently published in a March 2013 special edition of the *European Journal of Education*.

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OK, that's *what the report is*. But what does it actually say? Here are *six of the major findings from the report*:

1. Infrastructure provision at school level varies considerably between countries; lack of it is still an obstacle to greater use of ICT in schools.
2. Use of ICT, as measured in the surveys, may not have risen as much as might have been expected.
3. There is no overall relationship between high levels of ICT provision and student and teacher confidence, use and attitudes.
4. The policy focus should be on effective learning management as much as on ICT provision.
5. There is high, but not universal, use of ICT at home.
6. The presence of virtual learning environments [i.e. 'learning platforms'] in schools is increasing rapidly.

and *five related recommended policy actions*:

1. Strengthen public action at institutional, local, regional, national and European levels to boost ICT use at school so as to reduce the gap between ICT use out and within school.
2. Increasing professional development opportunities for teachers is an efficient way of boosting ICT use in teaching and learning since it helps build highly confident and positive teachers.
3. Despite having access and positive attitudes towards implementing ICT into their teaching and learning, teachers often find this difficult and require ongoing support - not only technical but also pedagogical.
4. Harness high levels of use of personally-owned mobile phones. ("What is clear", the report finds, "is that students are serious about the capacity of their mobile to support their learning.")
5. Use the dataset and lessons learnt from this survey for future investigations.

There is much to take away from the data and analysis in this publication, which will no doubt spawn much additional analysis by academics and policymakers and help inform future research. For what it's worth, and with minimal editorial comment, here is a (somewhat idiosyncratic) list of 20 things (it's a big report!) that struck me during my first quick reading:

1. "There are now around twice as many computers per 100 students in secondary schools as compared with 2006 - but the wide variations between countries reported in 2006 persist."
2. The student:computer ratio is between 3:1 to 7:1 across Europe, with (not surprisingly) lower ratios for older students. About 2/3 of computers are located in computer labs.
3. "There is a trend towards smaller and portable computers, away from desktop computers in 2006 to laptops and personally owned devices such as mobile phones in 2011."
4. "Laptops and interactive whiteboards are now extensively in place unlike in 2006." The rise, and indeed centrality to the ICT ecosystem in European schools, of interactive whiteboards -- a product that largely didn't exist in European schools a decade ago when the first large scale rollouts began in the UK -- is quite stunning. The report notes that "insufficient numbers of these are seen as a very important barrier to ICT use by teachers themselves in many countries".
5. Few e-readers, mobile phones and digital cameras are seen to be in use. [Of course, a good many European students, especially older ones, carry such things with them in the form of a single device.]
6. "Broadband is now almost ubiquitous in schools, while in 2006 this was in place in less than three-quarters of schools."

7. The report defines a highly digitally equipped school as one with "relatively high equipment levels, fast broadband (10mbps or more) and high 'connectedness' (e.g. having a website, email, a virtual learning environment and a local area network)."

8. Generally speaking, while there is lots of technology in European schools [especially when viewed in a global perspective], a lack of technology is still seen as an "important issue". [This begs the question: How much technology is 'sufficient? Might it be true that, the more you have, the more you want -- and feel you need?]

9. Across Europe, there are "wide variations in the degree of use of the ICT equipment available". Interestingly, the report finds "no correlation at EU level between level of computer provision in schools and frequency of use by students."

10. About 20% of European students in grade eight "report never/almost never using ICT". The highest percentage (31%) of students in this category is in ... Finland [home, of course, to one of the world's leading high tech companies -- Nokia -- and a consistent top performer in international assessments like PISA].

11. "Interestingly, no overall relationship was found between high levels of infrastructure provision and student and teacher use, confidence and attitudes."

12. "At EU level, no significant correlation is observed between students from low-income background and any of the three obstacles" [identified by school heads as the most critical]. Correlations are observed at the country level, however.

13. School heads are "close to unanimity about the fact that ICT use is essential to prepare students to live and work in the 21st century."

14. Students aren't using ICTs much for learning in school ... but are doing so much more outside of school. "Students’ ICT use during lessons still lags far behind their use of ICT out of school, affecting their confidence in their digital competences."

15. Teachers use technology ... primarily to prepare for class (and not in class itself).

16. "Teachers’ confidence and opinions about ICT use for T&L [teaching and learning] affect the frequency of students’ ICT use for learning."

17. "Teachers’ confidence in using ICT can be as crucial as their technical competence." A number of key recommendations from the report revolve around building capacity for "ICT pedagogical expertise at school level" through supporting things like providing more opportunities for teacher professional development, as well as more technical and pedagogical [!] support for teachers related to ICT use. "Boosting teacher professional development makes a difference," the report states, "and appears to be a condition for an effective and efficient use of the available infrastructure."

18. "Developing specific policies to use ICT in T&L [teaching and learning] and implementing concrete support measures at school level affect the frequency of students’ ICT based activities for learning in the classroom."
19. More generally, the report finds that "the need for specific policies and actions substantially to increase ICT use in T&L [teaching and learning] during lessons is clear."

20. _________

As with many of the other numbered lists of this sort presented from time to time on the EduTech blog, the last item is left deliberately blank, both as symbolic recognition of the fact that I have certainly missed a lot of things -- and as a prompt for people to attempt to fill in the blank themselves with observations as a result of their own reading of the report. (Feel free to do so in the comments section below, via email or on your own blogs.)

These observations are pretty much all from a pan-European perspective. One expects that it is through the specific analyses of individual themes and challenges in individual countries that many much more interesting observations and insights will emerge. While viewed from afar, 'ICT use in education in Europe' may seem to be of a certain general nature, but there is a wide variety of activity and practice across the continent. Diving into individual country reports, and comparing and contrasting sets of them, may yield more relevant and targeted policy guidance than the ten thousand meter perspective of general findings and recommendations.

Whatever your perspective or specific policy or research interest may be, there is sure to be something of potential relevance to your work in this rich new Survey. (I would expect to see data from this survey mashed up with other data sets -- PISA anyone? -- in short order by many researchers, for example.) Whether or not the questions asked during the course of this survey work are in fact the most important ones, there can be little denying the utility of what the teams at the European Schoolnet and University of Liege have produced here. As the OECD's Andreas Schleicher likes to say (echoing Henry Ford and many others), "without data, you are just another guy with an opinion." Policymaking related to ICT use in education is rife with opinions and ideological positions. Reports like this help bring us a little closer to a time when such opinions and positions are informed to a greater extent by data and good science than by politics, intuition, and marketing imperatives.

Other reports about ICT use in education in Europe of potential interest:

- **Key Data on Learning and Innovation through ICT at School in Europe 2011** [pdf] from Eurydice
- Current and past Country Reports from the European Schoolnet's INSIGHT observatory for new technologies and education are available through these two URLs and are part of a larger collection of informative publications from the European Schoolnet's INSIGHT program
- Of particular historical interest may be **The ICT Impact Report: A review of studies of ICT impact on schools in Europe** [pdf] published back in 2006
- Two reports, one from **2012** [pdf] and one from **2011** [pdf], developed as part of Europe's Digital Agenda Scorecard related to "Digital Competences in the Digital Agenda"
• Results from the previous pan-European survey exercise are available in this document from Empira, *Benchmarking Access and Use of ICT in European Schools 2006* [pdf], as well as in a short related article [pdf]
• A past EduTech post, *Around the World with Portugal's eEscola Project and Magellan Initiative*, may also be of interest.

*This is the second in a series of short posts about recent regional surveys of ICT use in education around the world. Last week’s post looked at Central and West Asia -- the next post will look at Latin America.*

*Note:* The image used at the top of this blog post of students at the Fyrstikkalleen School in Norway using laptops ("igniting new approaches to learning with technology") comes from Wikipedian Ragnam1211 via *Wikimedia Commons* and is used according to the terms of its *Creative Commons Attribution-Share Alike 3.0 Unported license*. The image in the middle of a blog post of a classroom in Austria ("ask us how we’re using ICTs") also comes via *Wikimedia Commons* and is in the public domain.
Almost a decade ago, delegates from over 175 countries gathered in Geneva for the first 'World Summit on the Information Society', a two-part conference (the second stage followed two years later in Tunis) sponsored by the United Nations meant to serve as a platform for global discussion about how new information and communication technologies were impacting and changing economic, political and cultural activities and developments around the world. Specific attention and focus was paid to issues related to the so-called 'digital divide' -- the (growing) gap (and thus growing inequality) between groups who were benefiting from the diffusion and use of ICTs, and those who were not. One of the challenges that inhibited discussions at the event was the fact that, while a whole variety of inequalities were readily apparent to pretty much everyone, these inequalities were very difficult to quantify, given the fact that we had only incomplete data with which to describe them. The Partnership on Measuring ICT for Development, an international, multi-stakeholder initiative to improve the availability and quality of ICT data and indicators, was formed as a result, and constituent members of this partnership set out to try to bridge data gaps in a variety of sectors. The UNESCO Institute for Statistics (UIS) took the lead on doing this in the education sector, convening and chairing a Working Group on ICT Statistics in Education (in which the World Bank participates, as part of its SABER-ICT initiative) to help address related challenges. At the start, two basic questions confronted the UIS, the World Bank, the IDB, OECD, ECLAC, UNESCO, KERIS and many other like-minded participating members of the working group (out of whose acronyms a near-complete alphabet could be built):

What type of data should be collected related to ICT use in education?

Not to mention:

What type of data could be collected, given that so little of it was being rigorously gathered across the world as a whole,
Comparing ICT use in education across all countries was quite difficult back then. In 2003/2004, the single most common question related to the use of ICTs in education I was asked when meeting with ministers of education was: What should be our target student:computer ratio? Now, one can certainly argue with the premise that this should have been the most commonly posed question (the answer from many groups and people soon became -- rather famously, in fact -- '1-to-1', e.g. 'one laptop per child'). That said, the fact that we were unable to offer globally comparable data in response to such a seemingly basic question did little to enhance the credibility of those who argued this was, in many ways, the wrong question to be asking. Comparing ICT use in education across all countries remains difficult today -- but in many regards, this task is becoming much easier.

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The UIS spent a few years meeting with national statistical agencies around the world in a process of proposing, and then pilot testing, an initial set of indicators related to ICT use in education that eventually could be used to collect data at regular intervals in countries from A(ustria) to Z(imbabw). In 2009, it published a very useful Guide to Measuring Information and Communication Technologies (ICT) in Education" [pdf] around the world. The fruits from this work are just now beginning to bloom. In December, the UIS released results from its first regional data collection effort. ICT in Education in Latin America and the Caribbean (full report [pdf]) provides a "regional analysis of ICT integration and e-readiness", informed by the results of a survey process that utilized a standard questionnaire [pdf]. It is the first of three such analyses will be released over the course of twelve months (results from the use of the questionnaire in five Arab States were just published -- more about that in next week's blog post -- with a final set of data and analysis from countries in Asia due to emerge later in 2013). While the report doesn't really contain any surprises (and, given that it is pretty dense with statistics, it will be tough for many people to read from cover to cover), its publication represents an important
milestone. **Countries around the world have been spending serious money on buying computers and connecting schools, and plan to spend much more in the coming years -- it's time we got serious about collecting data so that we can better track what is happening as a result.**

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In the words of Peter Wallet, who oversaw this work at UIS, "The UIS questionnaire aims to assess e-readiness since it provides a useful concept of the preparedness level of countries to really engage with ICTs in education .... The paper measures e-readiness, since it focuses on infrastructure, electricity, Internet connectivity, the availability of different forms of ICT-assisted instruction in schools, enrolment in programmes offering ICTs, and teachers’ general preparedness to use and teach with ICTs. This paper is meant to show country differences on several of these measures."

This is not the first attempt to survey and learn from ICT use across the region. Way back in 1982, *An Overview of Educational Technology in Latin America* discussed the findings of "a survey of 474 Latin American projects which used educational technology at all educational levels." More recently, publications from the Inter-american Development Bank like *Projects for the Use of Information and Communication Technologies in Education: Conceptual Framework* and *One-to-One Laptop Programs in Latin America and the Caribbean: Panorama and Perspectives* have proposed ways of analyzing ICT use in education across the region, as well as cataloging activities in key areas. Publications from UN ECLAC have looked at methodological issues related to ICT/education indicators and policies and practices across the region, together with related risks and opportunities. In 2009, the World Bank's infoDev program published the results of its *Survey of ICT and Education in the Caribbean* in two volumes. The UIS work complements such work in important and fundamental ways, and (one hopes) kicks off a process of regular data collection in the region, and in other regions of the world, using the same definitions, methodologies and processes. By doing so, it means to provide a foundation level of comparable data upon which subsequent analytical work can build.

Some quick highlights of patterns and trends documented in the UIS survey:

1. **The Caribbean is better resourced, and more connected**
   "Caribbean countries (particularly Anglophone) have much higher integration levels of ICT-assisted instruction and the essential infrastructure, including basic hardware (i.e. computers) and Internet connectivity, than most Latin American countries from South and Central America.... There are a number of countries in Central and South America where connection to electrical grids and building an adequate foundation of computer hardware and connectivity – precursors to various forms of ICT-assisted instruction – is currently a challenge."

2. **There are great differences across countries**
   "There are certainly vast differences between countries whereby many countries
have full integration (Caribbean) while others have very low integration levels, particularly in Central and South America. The present study also analysed the learner-to-computer ratio (LCR), in order to gain insight into the capacity to deliver CAI [computer-aided instruction]. For instance, the LCR ranges from 1:1 in Uruguay, where there are strong policies regarding the integration of ICT in education, to 122:1 in the Dominican Republic. This information is important, as it also sheds light on the quality of CAI. For example, while Cuba offers CAI in all schools, a LCR of 28:1 means that each student actually has little time to benefit from it. Internet connectivity for schools is very low in countries like Nicaragua and Paraguay, but universal (or near universal) in Uruguay and many Caribbean nations.

3. **Gender is not as significant an issue as one might expect (at least in comparison to other parts of the world)**

"There are many factors at the root of educational exclusion, but in most countries in Latin America and the Caribbean, gender does not seem to be significant – data suggest that girls are rarely excluded from enrolling in programmes offering CAI in primary education. It is also worth noting that those countries where girls are at a disadvantage in terms of enrolling in programmes offering CAI also tend to be the same countries in which general access is most limited. In other words, participation for both males and females is relatively low, suggesting competition for resources. Internet-assisted instruction is not as common as computer-assisted instruction, which is not surprising, given that Internet connectivity is also less readily available in many countries."

4. **At least rhetorically, considerations around ICT use seem to be integrated into national policies and curricula**

"Only four out of 38 countries reported that their national curriculum did not include recommendations for ICT-assisted instruction." [All four were Caribbean nations, for what that's worth.]

5. **There is more ICT infrastructure in secondary schools than in primary schools**

The big exception to this general pattern can be found in Uruguay, where free laptops have been provided to all students in public schools at the primary level.

6. **Radio use in educational settings (something that has a long tradition in some countries across the region) is no longer much in evidence. Educational television is either used a lot -- or not at all.**

"Despite the potential benefits of radio-assisted instruction and the evidence of its effectiveness in several contexts (e.g. where there is no electricity grid), there are little data to suggest that it continues to be commonly used across the region, which might reflect shifting priorities. Television-assisted instruction tends to be somewhat more common in the region and the data show that where it has been integrated in educational institutions, it is very nearly universal in many countries, while lacking in others."
Much of the data, it should be noted, relates to infrastructure. In other words, the survey focuses largely on what is available, and not how ICTs are being used. Nor does it look at the impact of ICT use on teaching and learning. As such, this work could be (and no doubt will be, in some quarters) criticized for "searching under the lamp post". (For those not familiar with the joke: A man is diligently exploring the area around a lamp post late one night. He explains to a person passing by that he has lost his keys. The person asks: "Have you lost your keys under the lamp post?" When the man replies that he has not, the person then asks, "If you have not lost them there, why are you looking under the lamp post?" The man replies, "Because that's where the light is!") It's a fair enough criticism. That said, for the most part we haven't had much good, reliable data about can be found under lamp posts around the world. Before we go out wandering too far in the dark, perhaps we should examine what we can see most clearly. As an earlier EduTech blog post about this effort, written back in 2009 at the workshop where the indicators and questionnaires were being finalized, stated:

"No doubt there will be criticism of just what data are being collected -- and what are not. It is of course *much* easier to criticize individual indicators and related questionnaire items (or the absence of such indicators and items) than to suggest options in their place. One participant voiced the (widely-shared) opinion that "It is a mistake to separate out technology infrastructure from pedagogical practices." Fair enough. But getting data on the former is (relatively) easy; the latter is quite difficult. The UIS-led process should be seen as a very important first step in the process of truly global data collection activities on this topic, a process that will no doubt be refined and expanded in the coming years."

One challenge for data collection efforts related to ICT use in education is that the ICTs themselves change over time. Indeed, reading through this report, one would find little evidence of the types of initiatives and practices related to the use of mobile phones and similar devices across the region of the sort that UNESCO itself recently catalogued in publications on *Turning on Mobile Learning in Latin America* [pdf] and *Mobile Learning for Teachers in Latin America* [pdf]. For what it's worth, indicators related to the use of things like mobile phones were considered (and hotly debated)
when the initial questionnaires were discussed and piloted a half-decade ago, but it was decided not to include them, given that they weren’t yet much in evidence at the time, and because it was thought that energies could be more productively directed to trying to measure what we already knew was out there (but weren’t counting) than to try to predict would might be coming in the future. Those who criticize the fact that the survey doesn’t cover things like mobile phones might find it interesting that there were also similar sorts of discussions about including a question related to the use of ‘virtual worlds in education’, given what seemed to be the growing prominence of the use of things like Second Life by some educators at the leading (or bleeding) edge of technology use in education. What constituted broadband for schools was another topic of hot debate back then -- much as it remains today.

Some of the data we collect today about ICT use in education through surveys such as this may not be that relevant or important tomorrow. The fact that such data are collected according to standard definitions and as a result of following rigorous protocols and methodologies will, however, remain very important. Indeed, one important legacy of this work (as well as similar work in other regions) may be that it helps to build the capacities of national statistical agencies and other groups to collect these sorts of data going forward in ways that are reliable and globally comparable. While some of the individual data points may change or lessen in importance in the future, the need for rigor in attempting to document just what is happening related to the use of ICTs in education around the world will only grow in the coming years. Congratulations to UIS for helping to lead this process.

You might also be interested in the following items about ICT use in education in Latin America from the World Bank:

- The EduTech blog has written a number of times about Plan Ceibal in Uruguay. The blog has also looked at research about computer use in schools in Colombia, the Enlaces program in Chile, a national survey of ICT and education in Brazil, educational technology use in the Caribbean, and an evaluation by the IDB of the OLPC project in Peru.
- Two of the most notable publications from the World Bank on ICT use in education in the region are Technology in Schools: Education, ICT and the Knowledge Society [pdf] by Hepp, Hinostroza, Laval and Rehbein, and a working paper by Barrera and Linden on The Use And Misuse Of Computers In Education.

This is the third of three planned blog posts looking at the results of recent regional surveys of ICT use in education around the world, following ones on Central and West Asia and Europe. A fourth blog post will appear next week, looking at the results of just-released work focusing on countries in the Arab world.

Note: The image used at the top of this blog post of school girls in Colombia ("¡más computadoras, por favor!") comes from the Wikipedian Efortega08 via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license. The image of two Colombian students reading ("let's see how we did") comes via Wikimedia Commons and was made available under the Creative Commons CC0
1.0 Universal Public Domain Dedication. The picture of an Ecuadorian student painting in Guayaquil ("filling in the picture in Latin America") also comes via Wikimedia Commons and is also in the public domain.
When I was back in school, and long before I had come across names like Wilbur Schramm or Manuel Castells, I remember learning about the power of new information and communication technologies to help change societies. Even from the (perhaps rather limited) perspective of someone growing up in a prairie state in the American Midwest, whether it was the role of pamphlets in the American Revolution or the more contemporary examples of audiotapes in the Iranian revolution or photocopiers helping to spread samizdat culture and messages in the countries of the former Soviet Bloc, it was clear that the emergence, adaptation and innovative uses of new 'ICTs' could help committed groups of people upend the existing status quo.

(Whether such 'upending' is a good thing or not depends, I guess, on your perspective, and the specific circumstances and context. Flip through the pages of UNESCO’s Community radio handbook, for example, and you may well be inspired, but read a recent paper from a researcher at Harvard about the role of RTLM radio in the Rwandan genocide and you will be chilled to the bone. Technology is a magnifier of human intent and capacity, as my friend Kentaro Toyama likes to say.)

More recently, the events of the 'Arab Spring' have been popularly attributed, in part, to the use of new ICTs and ICT tools like Twitter and SMS. Whether or not one agrees with this attribution (and about this there is much scholarly debate), there is no denying that rhetoric around 'ICTs' and the Arab Spring has increasingly marked and colored discussions about the use of educational technologies in many Arab countries. In announcing a recent report documenting technology use in education in the region, for example, the UNESCO Institute for Statistics (UIS) begins by noting that, "Against the backdrop of the Arab Spring, arguably the most significant ICT-assisted “learning” phenomena of the recent past, data from five countries provide a snapshot of ICT integration in education." It continues:
"Great strides have been made in the last decade to harness the power of Information and Communication Technologies (ICT) to help meet many development challenges, including those related to education. However, evidence shows that some countries in the Arab States continue to lag behind in fully implementing ICT in their education systems.

According to a UIS data analysis, which was based on a data collection process sponsored and conducted by the UNESCO Communication and Information Sector and the Talal Abu-Ghazaleh Organization (TAG-Org), policies for the implementation and use of ICT in primary and secondary education systems have not necessarily translated into practice. This is revealed in the newly released data from five participating countries."

Results from this data analysis were recently published by UIS in *Information and Communication Technology (ICT) in Education in Five Arab States: A comparative analysis of ICT integration and e-readiness in schools in Egypt, Jordan, Oman, Palestine and Qatar* [pdf], one part of a larger multinational effort to collect and analyze basic data related to ICT use in education around the world (results from a similar exercise in Latin America, also led by UIS, were featured on the EduTech blog last week; recent posts have also looked at related sorts of efforts in Europe and Central and West Asia).

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Outside the region, the particular (and noteworthy) case of Jordan is probably the best known. Indeed, the Jordan Education Initiative was for many years one of the leading examples cited of a country that 'got it' related to planning for the use of ICTs in education, and the Jordanian experience has been perhaps the best documented of any developing country's for an international audience. Last year the Ministry of Education published a report on *ICT Use and Diffusion in Schools in Jordan* [pdf]. The World Bank has published a related case study (and has featured the Jordan experience as part of its knowledge sharing with other countries on ICT/education topics), USAID supported a very informative evaluation (by EDC and RTI), and UNESCO featured Jordan (as chapter five) in its flagship report on ICT policies in education. The World Economic Forum helped support a widely ready study by McKinsey on *Building Effective Public-Private Partnerships: Lessons Learnt from the Jordan Education Initiative* [pdf] which, among other things, informed the creation of the Palestine Education Initiative [pdf] and a similar project in Egypt (a country profiled in infoDev's *Survey of ICT and education in Africa*.)

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Generally speaking, *Information and Communication Technology (ICT) in Education in Five Arab States* documents that, while basic levels of access to technology in schools vary (sometimes widely) across this set of countries, policies have for the most part not necessarily translated into practice. Here are some highlights from the report:
1. **Policy**
All five of the countries surveyed have formally developed policies related to the implementation and usage of ICTs in the primary and secondary education systems. "Data show that all five countries possess ... formal commitments to ICT in education at primary, lower secondary and upper secondary levels of education. In other words, not only have each of these countries written a policy and plan for the integration of ICT into education, but these countries have also created regulatory provisions and regulatory institutions (or bodies) to ensure that ICT-assisted educational reform takes place and advancement toward established objectives is monitored and evaluated." Qatar, Oman (here's a PDF version of the national policy) and Jordan all have specific curricula and/or specific related objectives related to ICT literacy at the primary, lower secondary and upper secondary levels. Oman's ICT/education policies are notable for the extent to which ICT use is considered.

2. **Basic infrastructure**
The learner-to-computer ratio (LCR) can be a useful proxy for the level of access to ICTs in an education system. Among this set of countries, Egypt is the outlier, with an LCR at the primary school level of 120:1 and at the secondary level of 25:1 (with this figures jumping to 441:1 and 94:1 respectively when we are talking about the ratio of learners to computers connected to the Internet, or LCCIR). Not surprisingly Qatar -- known to many in the international education community as the home of the annual WISE event -- boasts the lowest ratios, with an LCCIR of 5 at the lower secondary level, with Jordan and Oman not far behind, and the West Bank closer to this group than to Egypt. Generally speaking, a slightly higher percentage of computers are dedicated for pedagogical (as opposed to administrative) purposes in government schools than in private institutions across all countries, with the notable exception of the situation in the West Bank, where all computers are meant to be allocated for pedagogical purposes (a rate twice that for schools in the public sector). Just over 50% of schools in the two Gulf states reported having broadband connections to the Internet, in contrast to a third of schools in the West Bank. (No broadband data were reported for either Jordan or Egypt.)

3. **Gender**
Gender differences in the use of ICTs in education are not reported to be very large, and in fact seem to very slightly show more access to and use of ICTs by girls. That said, the authors are quick to point out that the data reveal little about the intensity or methods of use of ICTs by gender, and that, generally speaking, household data from around the world show that "boys are more likely than girls to use the Internet at home, work and informal settings in both developed and developing countries; therefore data [...] need to be understood within the broader education and societal contexts."
4. Teacher preparedness for using ICTs
According to this report, a "minority of teachers are prepared to teach basic computer skills or computing" across the five states, with Jordan reporting by far the highest rates in this regard. As for teachers trained to teach non-ICT subjects using ICTs, the West Bank and Oman lead the way.

These are just some of the quick highlights. For more information, you are of course directed to the full report [pdf]. For people who are interested in such things, UIS expects to release the source data on its web site at some point in the coming months.

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As with the other regional surveys profiled on this blog over the past month, it is hoped that work such as this will help strengthen the capacities of groups to collect data related to ICT use in education going forward in ways that are reliable and globally comparable, and UIS and its partners expect that this specific publication will help to catalyze a wider, and more in depth, survey of ICT use in education across the region. Working with UIS, UNESCO, KERIS, the IDB and other like-minded organizations around the world, the World Bank (through its SABER-ICT initiative) is working to help improve the availability of policy-related data, information, and knowledge on what matters most in using ICTs to improve the quality of education.

While we are not there yet, Information and Communication Technology (ICT) in Education in Five Arab States represents one more step in the right direction.

This is the fourth and final blog post in a series looking at recent regional surveys of ICT use in education in different parts of the world. A page dedicated to international surveys of ICT use in education has been created on the World Bank ICT and education web site to provide useful pointers to some of the key related documents and initiatives. This post was timed to appear on World Information Society Day. Occurring on 17 May each year -- the anniversary of the signing of the first International Telegraph Convention in 1865 -- as the result of a United Nations General Assembly resolution, World Information Society Day seeks to raise global awareness of societal changes brought about by the Internet and new technologies.

Note: The image that appears at the top of this blog post of the New Library of Alexandria ("revisiting the past while looking to the future") comes via Wikimedia Commons and is in
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Much is made of the necessity to 'scale up' in international development circles. Here at the World Bank, a quick search on our web site reveals publications and conferences with titles like Scaling Up Knowledge Sharing for Development, Global Scaling up Rural Sanitation Project, Scaling Up Local & Community Driven Development [pdf], Directions in hydropower: Scaling up for development, Scaling Up Affordable Health Insurance, Scaling up School Feeding -- the list goes on and on (and on). 'Scaling up', it would appear, is a goal (and a challenge) across pretty much all development sectors.

How can you achieve 'scale'?

It can be deceptively easy to propose a solution to a problem when you don't really understand the problem (especially if you think you do!). The 'failure' of many projects to introduce new technologies in education can, to some degree, be traced back to this simple truism. If you are pointed in the wrong direction, technology can help you move in that direction more quickly. To paraphrase the technologist Bruce Schneier (who was himself paraphrasing someone else): If you think technology can solve your education problems, then you don't understand the problems and you don't understand the technology. The solution lies in process and systems -- and people. Technology can help in all of these areas -- but first we need to make sure we understand what it really is that we need to do.

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When participating in planning discussions related to projects meant to introduce and support the use of educational technologies in schools in many middle and low income countries, I hear many complaints about 'pilot projects'. We have too many pilot projects, or so many people seem to believe, and they don't 'scale'. No more pilots is the 'logical' conclusion I then hear expressed from many policymakers, and from many donors. Personally, I tend to think we actually need more pilot projects. Many people automatically conflate (and thus confuse) small projects with 'pilot' projects. A pilot is meant to test something. We may well have too many small projects -- or, stated differently, we have lots of worthy small projects, but these small projects don't provide much insight into how such projects can be replicated or rolled out at a large scale across different environments. Related to the use of ICTs in education, what we really don't have are enough practical examples of how to pilot (activities, projects, approaches) at scale. If indeed 'scale' is an objective (and given the vast needs in so many places, one presumes it is) are
There types of 'pilot' projects featuring the use of ICTs in education that might be more likely to scale?

This is an interesting question to consider. For one potential answer to this question -- or at least for insight into one potential approach that may help get us closer to an answer to this question -- a look at recent experiences in Uruguay might be useful.

In Uruguay, they weren't terribly interested in small 'pilot' projects when they decided to provide each student with her own free laptop. (As regular readers of this blog will know, Uruguay was the first country to provide all students in government schools with free laptops.) For a number of reasons, in Uruguay it was decided to meet this objective as quickly and as equitably as possible, which meant that they starting thinking about scale from the very start. (One can agree or disagree with this approach: I am just relating what occurred in this particular circumstance.) In order to achieve scale, the Uruguayans needed some models that would scale. What types of models might those be? Anticipating that that some of the most acute challenges might be found in the most rural and in the poorest communities, they decided to start there. As they were successful in those places, they would then gradually take the models that were working there and apply them in less rural, and in less poor, places, until at the end they rolled out the project in the most affluent communities in the urban capital of Montevideo.

In other words they decided to:

**Start 'down and out', and then move 'up and in'**

This seems to me on its face to have been a largely sensible approach. I don't have data to support this -- there was no controlled experiment here -- but I do note that they were actually able to do this, and do it rather quickly!

Now, whether this approach might work in other places -- I don't know. One reason for this ignorance on my part is that the Uruguayan example is rather singular. I have worked with, evaluated, studied and/or advised scores of educational technology initiatives around the world in low and middle income countries. In my experience, there is a very typical pattern to how these things roll out:

1. There is a need to quickly demonstrate 'success', and so the choice is made to go where 'success' is most likely.
2. Where is success most likely? In urban schools, most commonly. Or sometimes, in semi- or peri-urban communities, provided they resemble urban schools in a number of key ways. Such as ...
3. The schools more or less 'work'. They have good teachers and strong principals. They are supported in various ways by local community groups -- and/or possibly by international NGOs and donors.
4. The schools have access to reliable (or pretty reliable) electricity, to mobile phone networks, and to reasonably reliable (and affordable) Internet connectivity.
5. The schools are accessible to vendors who are able to supply and support ICT hardware and software.
6. The schools can be reached easily by government education officials (for monitoring purposes, to provide additional support, etc.).
7. Classroom level instruction is in the country's dominant language (even better if it an 'international' language, which is what is spoken by most of the students at home).

The choice to start in such places is totally understandable. *The thinking is:* If it doesn't work there, it won't work anywhere. First, you need to see that something 'works' (a technology, an approach to using technology, an approach to training and supporting teachers to use technology, etc.). Once something is shown to 'work', it is easier to get the political support, and the funding, to expand your success to other schools across the country. (It doesn't hurt if the pilot schools can be easily visited by leading decision makers -- and it doesn't hurt at all if the children of such folks happen to go to such schools.)

*However:*

If it (the technology, the model, the approach) 'works' in this sort of 'privileged' environment, success may be a product of a number of factors that that don't apply in other, less advantaged places.

*So:*

**If you want to go to scale with your educational technology initiative, first start down and out before you move up and in.** Your learning curve will be steeper in the short run. The 'model' you end up with may have more modest goals when compared with what can be achieved in some of the most privileged and advantaged school and communities. But it just might work *everywhere*. Or, if not everywhere, at least it might work in a lot more places than if you had started 'up and in', and then tried to move 'down and out'.

Perhaps you can't start all the way down, and all the way out; perhaps such environments are simply too challenging to do much of anything. That is a political and policy choice that some places may (rightly or wrongly) choose to make. I fully concede that the Uruguayan example may be unique in ways (the country's level of affluence, its small size, its large urban population center, a social compact that highly values equity across society, the dominance of a single national language -- one can cite many such attributes pretty quickly) that set it apart from the situation in many other places. *Fair enough.* What works in Uruguay may not work in other places. 'Down and out' in Haiti, or in the Democratic Republic of Congo, or in Bihar state in India, or in Papua New Guinea, may represent a reality far beyond what 'down and out' might represent in a country like Uruguay.

But if you are truly interested in doing something impactful with the use of ICTs in the education sector at 'scale', and want to reach all (or almost all) schools, and children, and communities, there is abundant evidence that first starting where it is easiest doesn't tend to offer models that scale much beyond certain types of privileged environments. It does not necessarily follow that taking an opposite
approach might be more successful -- but it would be interesting to see some places try to flip the conventional model for rolling out ICTs across an education system. *Can't seem to find an approach to rolling out and supporting ICT use across an education system successfully at scale? Try starting down and out before you move up and in.*

*Note:* The public domain image of a scale used at the topic of this blog post ("the way most projects 'scale up' just might yield inequitable results") comes from [Wikimedia Commons](https://commons.wikimedia.org) and is in the public domain.
While I have no data to cite here (perhaps this is an idea that could be explored by an enterprising PhD student?), it is my strong suspicion, based on years of observation and work with groups introducing new technologies into education systems and communities in poor and middle income countries, that a 'Matthew Effect in Educational Technology' is observable -- and worth considering.

Just what is a 'Matthew Effect' -- and why should we care about it?

Almost a half-century ago, the sociologist Robert Merton observed (here's the original paper [pdf]) that famous scientists often get more credit for a research finding than a lesser (or un)known scientist does, even where the work of both scientists is very similar. He labeled this phenomenon the 'Matthew Effect', after a verse in the Bible (Book of Matthew 25:29) which roughly translates as 'the rich get richer'. In the words of the sociologist Daniel Rigbey, who wrote a book on the subject:

"Matthew effects tend to confer further advantages on the already-advantaged, other things equal. Of course, other things are never entirely equal. Multiple interacting factors are at play in a complex and connected world. Nonetheless, more than forty years of research findings suggest that Matthew effects are real and potentially powerful determinants of social outcomes in their own right, and especially when they are not countervailed. We simply cannot understand the dynamics of social inequalities in the world today without taking Matthew effects seriously into account."

Following Merton, Keith Stanovich spoke about a Matthew Effect in an educational context, noting that early successes in developing reading skills usually lead to greater successes with reading -- and thus with learning other new skills that build on the existence of good reading skills going forward.

How does this relate to ICT use in education?
Mark Warschauer, for one, has talked about how technology can help good schools become even better (see for example, his paper *Laptops and Literacy* [pdf], which draws on more extensive research he presented in a book of the same name). In a series of publications [pdf], researchers at the OECD have warned that "the digital divide in education goes beyond the issue of access to technology. A second digital divide separates those with the competencies and skills to benefit from computer use from those without."

Just who are those with the competencies and skills most likely to benefit from the use of ICTs in schools? It might be, of course, those who already have computers and other ICT devices (at home -- or in their backpacks). Kids from more educated families. Richer kids. Better educated kids, growing up in functional families in functional communities. Kids with good teachers in good schools. It may also be the kids who fit none of those categories but who are 'cognitively exceptional' (or, put another way, 'wicked smart'). When I see experiments that do things like, for example, drop computing devices into remote, poor communities in disadvantaged parts of the world, followed months later by anecdotes about the 'impact' that such devices have had on the education of certain of the children in these villages, I do wonder to what extent people just might be selectively observing how the most 'cognitively exceptional' kids were able to take advantage of the new tools. (A colleague of mine once joked that certain programs of this sort might represent one -- rather expensive! -- method of identifying the 'gifted and talented' in poor, isolated rural communities in Africa and Asia.) This is not to argue that such programs are bad -- or good! -- just that we need to be careful about how we interpret the professed related 'results'.

The *Matthew Effect in Educational Technology* does not apply only to students, of course. Consider the case of an overwhelmed (and ill-prepared) teacher working with students in a poor, remote, rural community. It is certainly possible to introduce new technologies (laptops, tablets) into such learning environments in ways that are useful to her (and indeed: powerful!), but doing so is often, to borrow a phrase popular in Silicon Valley, non-trivial. Dysfunctional schools may be challenged to support the basic maintenance of ICT equipment. The regrettable (and often observed, around the world) phenomenon of computers sitting unopened in boxes, and of locked computer labs, is in my experience much more likely to be observed in schools in low income and/or challenging environments (especially where a school principal is not terribly strong). Does this mean that such places are not appropriate places in which to invest in ICTs? No, not necessarily. There are potentially 'pro-poor approaches' to utilizing educational technologies in schools, but, in my experience, they usually don't happen by chance (or by magic). Those best equipped to make use of the technology do so, best. Conversely, those least well equipped to take advantage of new technologies can in fact be negatively impacted by the introduction of new technologies.

(As a sort of side note or corollary, I'll mention parenthetically that those best placed to make use of ICTs are often *the ones who actually get the devices* and related content, training, connectivity and support. Indeed, investments to introduce new technologies into schools are often first made
My point here is not to spark an argument about whether or not investments should be made in new technologies for schools, nor about which groups should (or should not) benefit from such investments. (Those can be and are useful arguments to have, but my goal is not to open up those particular cans of worms right now.) Rather, it is to suggest that the Matthew Effect in Educational Technology may well be relevant when new technologies are introduced into school settings in country X, or in community Y. Whether or not you think this sort of thing might be important, and/or what you might do as a result, is perhaps a matter of opinion (and eventually, potentially, policy). But before you begin whatever it is you plan to do, indeed **while you are planning whatever it is you aim to do**, it might be worth spending some time thinking about the potential for 'Matthew Effects' to occur, that what you are planning may largely result in further advantaging the already advantaged while not doing much to benefit those with a variety of disadvantages - - and plan/act accordingly.

It may in fact be the case that investments in new technologies are potentially even more important in poorly equipped schools, as tools to help overcome some of the many evident disadvantages observed in such environments. Compelling arguments can be -- and have been -- advanced in this regard in many places in the world. Unfortunately, however, the approach adopted by many well-meaning folks who 'win' such arguments and then move on to doing something as a result is too often what has been labelled the 'worst practice' in ICT use in education: **Dump hardware in schools, expect magic to happen**. The science fiction writer Arthur C. Clarke once said that 'Any sufficiently advanced technology is indistinguishable from magic.' Sometimes, it must be said, magic does happen on its own. If you look selectively enough, you will no doubt be able to identify some magicians doing magical things with the computers (or tablets or mobile phones or interactive whiteboards or ____) that have found their way into their schools and communities despite the fact that little planning was done regarding how the devices would be used, and how this use could be supported. Some of these magicians may even be found in circumstances that might surprise you -- despite the fact that they had largely been left to their own devices. After 15 years of work with technologies in schools and communities around the world, rich and poor, urban and rural, with boys and girls and people of all different ethnic or tribal or religious affiliations, from China to India, Eritrea to Ghana, Cambodia to Costa Rica, I am not surprised when I come across such people and see the innovative and practical and sophisticated things they are able to do with ICTs. I continue to be energized and excited by these real life examples of what is possible, by the power of technology put to all sorts of inventive uses by creative students and teachers and principals in ways that are useful and relevant (and sometimes unexpected) to people's educations -- and to their lives. But I am also not surprised that these sorts of people, and the circumstances in which they operate, are often outliers. This isn't to say that other students and teachers and principals can't or won't be just as ingenious or inventive or creative with the same technology devices -- but they just may need a little (or a lot of) help and guidance
and support along the way. "All things are possible": That's another quotation from the Book of Matthew. Too many planning efforts related to large scale investments in ICT use in education dwell too long on what is possible, while ignoring much of what is predictable, and in the end what is practical to do doesn't benefit the poor and disadvantaged all that much. But it doesn't have to be that way.

You may also be interested in:

- The Second Digital Divide
- A different approach to scaling up educational technology initiatives
- Educational technology and innovation at the edges
- A new wave of educational efforts across Africa exploring the use of ICTs
- One Mouse Per Child
- Interactive Radio Instruction: A Successful Permanent Pilot Project?
- Using ICTs in schools with no electricity

Note: The image of a tennis match in Bad Homburg, Germany ("advantage to the ladies at the top") comes via Wikimedia Commons and is in the public domain.
Not a week goes by where I don't receive an unsolicited email from a company touting the benefits of its new 'educational videogame'. Indeed, just last week I opened my inbox to find two separate emails proclaiming how two different mobile gaming apps were destined to "transform learning!!!" Now, in a lot of the cases, I must confess that I am not always sure why something is an 'educational game', and not just a 'game' (although if I am in a difficult mood, I might offer that in too many instances an 'educational game' is 'a game that really isn't much fun'). That said, there is no denying that videogames are big business around the world. So -- increasingly -- is education. Even most people who fear that potential negative effects of some (or even most) videogames on young people would, at the same time, acknowledge the promise and potential for videogames to offer enriching learning experiences. The history of the introduction of educational technologies is in many ways long on promise and potential, however, and short on actual evidence of how they impact learning in tangible and fundamental ways.

Much is made of the potential for ICTs to be used to promote more personalized learning experiences through the introduction of various types of ICT-enabled assessment systems. For me, it has long seemed like the most powerful real-time learning assessment engines have been found in videogames, where actions (or inactions) are often met with near instantaneous responses, to which the player is then challenged to respond in turn. This feedback loop -- taking an action, being presented with information as a result, having to synthesize and analyze this information and doing something as a result -- might meet some people's definition of 'learning'. A good videogame engages its users so strongly that they are willing to fail, and fail, and fail again, until they learn enough from this failure that they can proceed with the game. Even where educational software is not explicitly labeled as a 'game', designers are increasingly introducing game-like elements
(badges, achievement bonuses, scoring systems) as a way to promote user (learner? player?) engagement as part of a process known as 'gamification'.

The use of videogames for educational purposes, or at least in educational contexts, is far from an OECD or U.S. phenomenon. Whether I am visiting a school computer lab after hours in central Russia, an Internet cafe filled with students in Indonesia or standing behind some schoolgirls carrying phones between classes in Tanzania, 'educational' videogames seem to be nearly everywhere. Past posts on the EduTech blog have profiled things like the use of video games on mobile phones to promote literacy in rural India and EVOKE, an online game for students across Africa which the World Bank helped sponsor a few years ago. When I speak with young software entrepreneurs in Nairobi or Accra or Manila, they often talk excitedly about the latest educational game they are developing (for markets local and distant).

Do educational games 'work'? Are they 'effective'? And if so: How can they be used in schools?

Questions such as these are of increasing interest to scholars. Given both their potential for learning, and how aggressively videogames are being marketed to many education systems, they should be of increasing interest to educational policymakers as well. Some recent research brings us a little closer to a time when we can answer some of them.

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While videogames are played all around the world, most recent research into videogames and learning has a strong OECD (and especially U.S.) bias, looking largely at learning contexts in industrialized country settings. The Gates Foundation has been funding lots of notable activities and research in this area, including a newly-released report by SRI (part of the Games Learning and Assessment Lab, or 'GlassLab', initiative) on Digital Games for Learning: A Systematic Review and Meta-Analysis, which summarizes and analyzes findings from 77 experimental or quasi-experimental studies published in peer-reviewed journals between 2000 and 2012. According to the paper, "With increasing access to computers, consoles, and cell phones, young people encounter opportunities for gaming everywhere. Given the extensive reach and saturation of game playing in modern youth culture, there is an untapped potential for increased learning if games can be successfully designed .... These preliminary findings will help GlassLab and other educational game designers make appropriate, research-based decisions in developing new digital games for students."

The academic tone and language of the paper may make for tough reading for most general readers. There is a lot of nuance in the findings, which are accompanied by a slew of caveats (e.g. related to sample sizes, and so analyses should be considered exploratory). The full report is due to be released in September/October of this year. Here are some of the highlights so far:

- Most of the games studied were single player (82%) and almost all were played on PCs (92%).
• When digital games were compared to other instruction conditions without digital games there was a moderate to strong effect in favor of digital games in terms of broad cognitive competencies.
• Students at the median in the control group (no game) could have been raised 12% in cognitive learning outcomes if they had received the digital game. [For many observers, this has been the ‘headline’ finding.]
• There was evidence that digital games contributed to increased intellectual openness and positive core self-evaluation outcomes.
• Impacts of digital games on interpersonal competencies are less clear.
• The efficacy of digital games for learning depends on their design.

Even where there are demonstrated benefits from the use of certain educational games, it can be quite difficult for teachers to figure out how to integrate their use into student learning. A very interesting report published earlier this year by the Joan Cooney Ganz Center (the folks behind Sesame Street) highlights some of these challenges, and offers some related recommendations. Games for a Digital Age: K-12 Market Map and Investment Analysis analyzes the sales and market potential for digital learning games in the institutional K-12 market in the United States. While the U.S. is probably the largest and most 'mature' (relatively speaking) market for educational videogames, Games for the Digital Age contains insights that may well be relevant and applicable for other education systems around the world. I am increasingly contacted by young entrepreneurs and software developers in developing countries who are interested in creating educational videogames, or educational apps that contain many elements borrowed from videogames. It is exciting that such people are turning their attentions to developing useful products and services for the education sector. To the extent that they have their eyes on OECD markets while at the same time selling to ministries of education, schools and communities closer to home, this report should be of interest. It is, thankfully, a quick read (and much easier to digest than the one from SRI highlighted above). Here are some quick things I took away from it (as well as from a related presentation that one of the authors, John Richards, gave at this year's EdTech Industry Summit):

• Educational games are supplemental (i.e. not core to learning activities in schools)
• Educational games need to fit into the established calendar of the school day (e.g. 50 minute periods), and year.
• A game that requires accompanying teacher professional development to be used successfully is a non-starter.
• If they are to be used, games need to be easy: easy to find, easy to access, easy to understand, and easy to link to existing learning activities.
• Generally speaking, you can divide educational games into two types, by time required:
  • short form (not very profitable, little research, easy to insert into class)
  • long form (solid research, difficult to integrate into schools, offer opportunities for in-depth learning, promotes development of 21st century skills)
Another report last year from the Cooney Center (*Teacher Attitudes about Digital Games in the Classroom*) highlighted some of the barriers to the U.S. of educational games in U.S. schools, but in my experience these barriers are pretty representative of challenges in most other countries as well. Cost was seen by teachers as the top impediment to the use of educational games. Inadequate access to necessary technology, and emphasis on standardized test scores (few educational games are seen as relevant to related test prep activities) and unsupportive administrators and parents were other key barriers.

Educators are faced with an apparent dilemma: If they want to take advantage of the types of education games (i.e. the 'long form' ones) whose impact is well-researched, and to integrate their use into classroom activities, existing schooling practices need to be changed. *This is unlikely to happen, of course.* On the other hand, the types of games that can most easily be integrated into existing schooling practices ('short form' games) are not very profitable for firms to produce (in which case, they may not be produced in sufficient quantities) and there is not a solid research base to support their use. What to do, then? *Games for the Digital Age* suggests that game developers focus on creating repositories of *lots* of little, short games, easily findable by teachers, linked to specific curricular objectives. [I would note parenthetically that this applies just as well to digital learning resources of any sort, not just games.] Practically speaking, developers may thus need to invest in many short form games so that teachers can then find the handful of games that are relevant to them. This means that lots of games may need to be developed, and most of them probably will not be used very much. While this advice is aimed at the developers of educational games, there are clear messages here for policymakers as well.

While researchers have been studying the potential impact of videogames on learning for decades, in many ways the related research base and industry remain in their infancy. Both are now growing quickly, however. No doubt the 'adolescent' stage of the use of educational videogames will be messy and complicated (as it is for most students in real life who play and learn with them!). The English comedian Stephen Fry has remarked that "No adolescent ever wants to be understood, which is why they complain about being misunderstood all the time." Perhaps. Hopefully research from groups like Gates, SRI, the Cooney Center and scores of other
groups going forward will help to minimize the inevitable pain and misunderstandings along the way.

Of potentially related interest:
- *Our Princess Is in Another Castle: A Review of Trends in Serious Gaming for Education*
- *What in the World Happened to Carmen Sandiego? The Edutainment Era: Debunking Myths and Sharing Lessons Learned*
- Designing the Future of Games, Learning, and Assessment
- The Games & Learning website will launch later this year as a clearing house for research, reports and news about this growing sector.

*Note:* Both images that accompany this blog post ("playing to learn?" and "an educational game boy") come via [Wikimedia Commons](https://commons.wikimedia.org) and are in the [public domain](https://creativecommons.org).
10 principles to consider when introducing ICTs into remote, low-income educational environments
by Michael Trucano
#19: originally published on Monday, 8 July 2013

There are, broadly speaking, two strands of concurrent thinking that dominate discussions around the use of new technologies in education around the world. At one end of the continuum, talk is dominated by words like 'transformation'. The (excellent) National Education Technology Plan of the United States (Transforming American Education: Learning Powered by Technology), for example, calls for "applying the advanced technologies used in our daily personal and professional lives to our entire education system to improve student learning, accelerate and scale up the adoption of effective practices, and use data and information for continuous improvement."

This is, if you will, a largely 'developed' country sort of discourse, where new technologies and approaches are layered upon older approaches and technologies in systems that largely 'work', at least from a global perspective. While the citizens of such countries may talk about a 'crisis' in their education systems (and may indeed have been talking about such a crisis for more than a generation), citizens of many other, much 'less developed' countries would happily switch places.

If you want to see a true crisis in education, come have a look at our schools, they might (and do!) say, or at least the remote ones where a young teacher in an isolated village who has only received a tenth grade education tries to teach 60+ children in a dilapidated, multigrade classroom where books are scarce and many of the students (and even more of their parents) are often functionally illiterate.

Like so many things in life, it all depends on your perspective. One country's education crisis situation may be (for better or for worse) another country's aspiration. While talk in some places may be about how new technologies can help transform education, in other places it is about how such tools can help education systems function at a basic level.

The potential uses of information and communication technologies -- ICTs -- are increasingly part of considerations around education planning in both sorts of
places. One challenge for educational policymakers and planners in the remote, low income scenario is that most models (and expertise, and research) related to ICT use come from high-income contexts and environments (typically urban, or at least peri-urban). One consequence is that technology-enabled 'solutions' are imported and (sort of) 'made to fit' into more challenging environments. When they don't work, this is taken as 'evidence' that ICT use in education in such places is irrelevant (and some folks go so far to state that related discussions are irresponsible as a result).

There is, thankfully, some emerging thinking coalescing around various types of principles and approaches that may be useful to help guide the planning and implementation of ICT in education initiatives in such environments. As part of my duties at the World Bank, I have been discussing a set of such principles and approaches with a number of groups recently, and thought I’d share them here, in case they might be of wider interest or utility to anyone else. Are they universally applicable or relevant? Probably not. But the hope is that they might be useful to organizations considering using ICTs in the education sector in very challenging environments -- especially where introducing these principles and approaches into planning discussions may cause such groups to challenge assumptions and conventional wisdom about what 'works', and how best to proceed.

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As with many lists of this sort that have featured on the EduTech blog in the past, the items presented below are not meant to be comprehensive in scope. Targeted specifically at people planning for uses of ICTs in the education sector, these principles and approaches are meant to complement and extend other, more developed thinking (informed in many cases by a rigorous evidence base) at the World Bank of the sort found in our education strategy (“Invest early, invest smartly, and invest for all”), our ICT strategy and publications such as Efficient Learning for the Poor: Insights from the Frontier of Cognitive Neuroscience. In no particular order, and with those caveats in place, here are:

10 principles or approaches to consider when planning to introduce ICTs into remote, low-income educational environments

1. The best technology is the one you already have, know how to use, and can afford
The introduction of a new technology is considered on its own to be 'innovative' in many circumstances. Parachuting in the 'latest and greatest' device or gadget may have strong political appeal, and fatten the bottom lines of certain firms, and may possibly even be effective in some cases, but instead of instinctively trying to 'innovate' using new technologies, which bring with them lots of challenges, it may be useful to ask, How can we innovate using what we already have? In poor, rural, isolated communities, the technologies already at hand are almost always mobile phones and radios. Before considering the latest and great new gadget, why not see what quick gains might be made by utilizing technologies which already exist (and are being used, and sustained) in such communities? It might be that using
such technologies in complementary ways (an interactive radio program, for example, supported by SMS-based outreach to and between teachers) might achieve many of the objectives that a single, 'new' technology can. Or maybe not. But it's worth asking the question.

2. Start down and out, and then move up and in
What types of educational technology projects are most likely to scale -- those that are piloted in relatively 'privileged' environments until they 'work', and then expanded to reach other, less advantaged communities, or projects that take the opposite approach? If it (the technology, the model, the approach) works in a privileged environment, success may be a product of a number of factors that that don't apply in other, less advantaged places. If you want to go to scale with your educational technology initiative, first **start down and out before you move up and in**. Your learning curve will be steeper in the short run. The 'model' you end up with may have more modest goals when compared with what can be achieved in some of the most privileged and advantaged schools and communities. But it just might work *everywhere*. Or, if not everywhere, at least it might work in a lot more places than if you had started 'up and in', and then tried to move 'down and out'.

3. Treat teachers like the problem ... and they will be
Over the years I have talked with lots of people who see teachers (and teachers' unions) as a 'problem' that needs to be 'solved'. One 'solution' increasingly considered is to figure out ways to use ICTs as a sort of metaphorical stick with which to prod teachers into various sorts of actions. This impulse is perhaps understandable in places that suffer endemic challenges related to (for example) teacher absenteeism, which is certainly a very serious problem in certain (often poor, rural) communities. That said, it may not be all that productive at a practical level. A well known study done by researchers at the MIT Poverty Action Lab a number of years ago (and well worth reading, in my opinion) looked at a program in Udapur, India in which "teachers were instructed to have their picture taken each day with students and were paid only when the cameras recorded them present." According to the authors, in this case "objective monitoring with incentives worked" -- in other words, a mechanism was found to motivate teacher attendance. On numerous occasions, in conversation with policymakers in many different countries, I have heard this study cited as proof that technology (in this case, a digital camera) can be a 'solution' to the problem of teacher absenteeism. Perhaps. But there is a real danger in many such discussions of confusing the symptoms with the underlying pathology. So-called 'silver bullet solutions' (aim the right weapon at a problem and you can 'kill' it) figure prominently in the checkered history of educational technologies. Things are seldom so simple, however. Yes, the fact that mobile phones with cameras are increasingly ubiquitous in rural communities around the world does mean that it may be possible for community members to stand outside schools and take pictures of teachers as they enter and exit (a scenario I have had pitched to me on three separate occasions -- in one case students were meant to wield the cameraphones themselves) and send them on to education authorities or post on a web site for public shaming. But there just might be some unintended consequences from such activities .... Another option might be
to explore how ICTs can be used to support teachers with positive incentives linking them to other teachers via text messaging groups to help form professional support communities, or to help them save time in lesson preparation by providing additional learning resources via television (or delivered all at once on a USB stick), or to help improve their mastery of the subjects which they teach through interactive radio instruction. Sticks can sometimes work ... but so can carrots. Do you want to use ICTs to punish, or to nourish?

4. It’s the content, not the container
All too often, educational technology initiatives focus largely on the technology itself. It is possible to become so enamoured with the technology (and so distracted by device-related questions: should we buy tablets or laptops?) that insufficient attention is given to how to use whatever devices are eventually deployed to their full effect. As we move to a greater proliferation of devices, combined with the fact that we will be accessing more content from multiple places, a greater value will be placed on the content, and how that content is used, rather than on any one particular device. Viewed from this perspective, the future of education is in the content, not the 'container'. It’s about more than just content, of course -- it's also about the connections and the communities (students collaborating with each other, teachers supporting other teachers) that technologies can help enable, catalyze and support as well.

5. If you are pointed in the wrong direction, technology may help you get there more quickly
In many cases, 'technology' can be seen as the 'solution' -- but it is not exactly clear what problem the technology is meant to help solve, and how exactly it will do this. As the ICT in Education Toolkit states, "Technology is only a tool: No technology can fix a bad educational philosophy or compensate for bad practice. In fact, if we are going in the wrong direction, technology will get us there faster. Providing schools with hardware and software does not automatically reform teaching and improve learning. Much depends on educational practices and how ICTs are used to enhance them."

6. Anticipate, and mitigate, Matthew Effects
A Matthew Effect in Educational Technology is frequently observed: Those who are most able to benefit from the introduction of ICTs (e.g. children with educated parents and good teachers, who live in prosperous communities, etc.) are indeed the ones who benefit the most. Just because investments in educational technology use are justified by rhetoric claiming that such use will benefit 'the poor' doesn't mean that this will actually happen. In fact, the opposite many well occur. Too many planning efforts related to large scale investments in ICT use in education dwell too long on what is possible, while ignoring much of what is predictable, and in the end what is practical to do doesn't benefit the poor and disadvantaged all that much. It doesn't have to be that way -- but you may need to take some proactive steps (and monitor the impact of what you're doing regularly) to mitigate these potential effects.
7. To succeed in doing something difficult, you may first need to fail (and learn from this failure)
Trying to help isolated, poor communities improve their schools and the education that they offer to their children is a nontrivial endeavor. If the related challenges were easy to overcome, one expects that more of them would have been. Unfortunately, such places may be no stranger to 'failed' projects of various sorts, and the reasons for such failures may be varied and complex. The history of the use of technology in education also features lots of 'failures'. Indeed, 'failure' is a defining characteristic of many educational technology projects ... including the successful ones. A key ingredient for success is often an ability, and willingness, to recognize and learn from failure -- and then change course as needed. How can one learn from failure? A commitment to learn through experimentation and iteration, supported by robust and regular monitoring and evaluation, can certainly help. The flexibility to be able to make changes, and the humility to admit that you may not know everything at the planning stages of whatever it is you hope to accomplish, doesn't hurt either.

8. Put sustainability first
Often times, the first goal of an educational technology project is to show that it 'works'. Only once this is demonstrated does attention turn to issues of sustainability. Sustainability should be a first order concern -- especially in remote, low resource communities. If you design something to work for two years, and it does indeed work for two years, what have you really accomplished at that point? The incentives, tools and mechanisms for sustainability should be considered up front, and introduced and tested from day one. Donations of equipment can be vital in helping to initiate an educational technology project -- they can rarely be counted on to sustain one. If something can break -- it will. If a dependence is created on outside expertise -- inevitably this outside expertise will disappear at some point. Plan for equipment to break, plan for outside expertise to withdraw, plan for novelty to wear off -- what will happen then?

9. We know a lot about worst practices -- we should make sure we don't repeat them
While there is still much to learn about 'what works' related to cost-effective, locally appropriate, impactful uses of ICTs in education in poor, isolated communities around the world, there is a significant body of knowledge and experience about what doesn't work. Dumping hardware in schools (and hoping that 'magic' will happen), thinking about educational content only after you have rolled out your hardware, making a big bet on an unproven technology or single vendor without planning about hope to avoid 'lock-in' -- these sorts of things are recipes for heartache. Working in challenging environments is difficult, there is no need to make it more so by repeating the sorts of mistakes that others have made time after time, in place after place. Not only is there no need to 're-invent the wheel' in this regard, (as Alan Kay advised) don't re-invent the flat tire!

10. ________
As with other 'lists of ten' published on the EduTech blog, #10 has been deliberately left blank here, both as an acknowledgement that there are other
potentially useful principles and approaches to consider, and as an invitation to add your own below, based on your own experiences.

Other items of potential related interest:

- One Mouse Per Child
- Using ICTs in schools with no electricity
- Checking in with BridgeIT in Tanzania: Using mobile phones to support teachers
- A different approach to scaling up educational technology initiatives
- Mobile Phones and Literacy in Rural Communities
- Interactive Radio Instruction: A Successful Permanent Pilot Project?
- Evaluating One Laptop Per Child (OLPC) in Peru
- Educational technology and innovation at the edges
- Searching for India's Hole in the Wall

Note: The image used at the top of this blog post of students and their teacher in Tibar, Timor-Leste (East Timor) ("there must be an I, a C, and a T here somewhere...") was taken by Joao dos Santos for the World Bank (Photo ID: JDS-TL003 World Bank). It is available via the World Bank Photo Collection on Flickr and is used according to the terms of its Creative Commons Attribution-NonCommercial-NoDerivs 2.0 Generic license (CC BY-NC-ND 2.0).
Big educational laptop and tablet projects: Ten countries to learn from
by Michael Trucano
#20: originally published on Wednesday, 31 July 2013

Recent headlines from places as diverse as Kenya ("6,000 primary schools picked for free laptop project") and California ("Los Angeles plans to give 640,000 students free iPads") are just two announcements among many which highlight the increasing speed and scale by which portable computing devices (laptops, tablets) are being rolled out in school systems all over the world. Based on costs alone -- and the costs can be very large! -- such headlines suggest that discussions of technology use in schools are starting to become much more central to educational policies and planning processes in scores of countries, rich and poor, across all continents.

Are these sorts of projects good ideas?

It depends. The devil is often in the details (and the cost-benefit analysis), I find. Whether or not they are good ideas, there is no denying that they are occurring, for better and/or for worse, in greater frequency, and in greater amounts. More practically, then:

What do we know about what works, and what doesn't (and how?, and why?) when planning for and implementing such projects, what the related costs and benefits might be, and where might we look as we try to find answers to such questions?

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The World Bank has not thus far been involved in providing substantial direct financial assistance to support these sorts of programs (although we have been involved in numerous related policy dialogues, and have done some evaluation work here and there, as a way to help inform such policy dialogues). A number of the high profile 'one laptop per learner' projects have now reached new phases of development, and new sets of large scale educational laptop programs are being announced. At the same time, 'educational tablets' have gone from a curiosity and novelty in some education systems to become the primary computing devices meant for students and teachers in others. A few years ago, the EduTech blog
published a list of '1-to-1 educational computing initiatives around the world' in an attempt to identify large scale programs providing each student with her own laptop computer. Much has (obviously) happened since then. Despite being over three years old, that blog post still generates a decent amount of traffic, and the list apparently still is cited rather often. I have asked been asked by groups in a few places for updated pointers to some prominent initiatives from which useful lessons might be learned in the coming years. In case this information may be useful to or of interest to anyone else, I thought I'd offer, in no particular order, a small list of

**Big educational laptop and tablet projects: Ten countries to learn from**

1. **USA**
   Reflexively, many countries look to, and hope to compare themselves against, the United States when considering educational technology initiatives. (Whether or not this is a good or useful practice, especially for many less affluent countries, or for countries with decidedly different educational contexts and socio-economic circumstances, is perhaps fodder for another discussion.) The United States is of course a very big and diverse place, with a very decentralized education system (some might say it is actually a collection of education systems). Technology purchasing decisions are not made at the national level, but at the state or, more often, the district level (the country has over 14,000 school districts in total), which tends to complicate other countries' attempts to 'benchmark' their level of use of educational laptops and tablets against 'the U.S. experience'. Focusing one's gaze at the state or local level can be more useful. While some elements of its program may change going forward, the U.S. state of Maine has been, and continues to be, a global pioneer in the use of laptops in schools, and lessons from the Maine experience have influenced policymakers in scores of other places. The recent decisions of the Los Angeles Unified School District to purchase iPads for its students (here are some thoughts from Larry Cuban on this announcement) and that of education officials in Miami Dade (Florida) to ensure access to digital devices to all students are worth noting, as these are two places likely to receive a great deal of media and research attention in the coming years. It is perhaps also worth mentioning that many school districts the U.S. are increasingly promoting 'bring your own technology' (or 'BYOT') initiatives (also known as BYOD, or 'bring your own device') as a way to increase the access to laptops and tablets within schools, which raises sets of additional questions worth considering related to things like (among others) equity, costs, maintenance and digital safety.

2. **Uruguay**
   The first country in the world to provide all primary school students with free laptops (in public schools), Uruguay's pioneering Plan Ceibal now finds itself at a crossroads. While the project continues to enjoy wide support from citizens, the sight of young children toting and using their small green and white One Laptop Per Child (OLPC) XO laptops is no longer novel, but rather part of the educational and cultural landscape. How can the level of excitement and momentum engendered by Plan Ceibal be maintained and sustained, especially as the really tough work begins: helping to catalyze and enable change as part of larger efforts at 'whole system reform'?
3. Thailand
While most large scale efforts to introduce '1-to-1 computing' in education have featured laptops, Thailand is notable in that it has instead chosen to use tablets. Heralded as the largest educational tablet initiative of its kind when it was first announced (although this title is now claimed by another country, see below), Thailand's efforts are just beginning, but, as with similar initiatives in many other countries, have already served as lightning rods for criticism and optimism.

4. Peru
Close to one million OLPC XO laptops have been distributed to students in Peru, a process which began in 2008, focusing initially on small schools in poor (and often rather remote) communities. Examining the Peruvian experience, colleagues at the Inter-american Development Bank (IDB) has been engaged in the first large-scale randomized evaluation of the impact of the OLPC program. The results so far should provide much food for thought for educational reformers and technology proponents in other countries who feel that large scale introductions of new technologies will, in and of themselves (and perhaps magically), bring about a variety of promised positive changes in educational systems. Reality can be a little more complicated -- and messy.

5. Kenya (and Rwanda)
While it has not yet even begun, the bold three-phase plan in Kenya to begin rolling out laptops in its education system in January 2014 has already attracted much international attention. Starting with 400,000 free laptops delivered to new first graders, this project, if it proceeds as announced, would quickly become the largest effort of its kind on the continent. While Kenya has been home to a number of encouraging small pilot projects, the logistical challenges of doing something this large, this quickly, will be, as they like to say in Silicon Valley, 'non trivial'. Lessons from its East African neighbor, Rwanda, which has distributed over 200,000 OLPC XO laptops so far, are no doubt being eagerly consumed and digested by policymakers and experts in Nairobi. While difficult, success in logistics is only a means to an end. Impacting the teaching and learning process inside and outside of schools in positive ways, fuelling the aspirations of a new generation of Kenyan students (and their families), sustaining positive momentum and results over time -- these are much more difficult goals to achieve. And then there is the question of how to pay for all of this, especially in ways that do not impede or constrain efforts to address other pressing educational and developmental priorities. In these and in other regards, the Kenyan experience with educational technologies will definitely one to watch in the coming months and years.

6. Turkey
While Thailand's plans to introduce tablet computers into the hands (and onto the laptops) of its students immediately marked it as a potentially pioneering middle income country in the scope of its use of educational technologies, the scale of what is being rolled out in that Southeast Asian country has since been dwarfed plans and efforts at the other end of the continent, where Turkey's FATIH ("Movement to Increase Opportunities and Technology") project is introducing over ten million
tablets (and tens of thousands of interactive whiteboards, printers and other peripherals) into Turkish schools. Large scale pilots are already underway, as is a huge tender process to award contracts to roll out and support the project. In contrast to how the tablet project was conceived in Thailand, local manufacturing is meant to play a very important role in the project in Turkey.

7. India
Before Turkey, and before Thailand, it was the Aakash project in India which excited the imagination of many proponents of putting huge numbers of tablet computers into the hands of students in a developing country. That project has moved forward in fits and starts, but is only one of numerous efforts to introduce tablets at laptops across the continent-sized South Asia country. Large efforts in Rajasthan have recently been announced, following on efforts which began earlier in states like Uttar Pradesh. Initiatives across India will be particularly interesting to monitor, given the scale at which they will be occurring, and the fact that there is already a great deal of local knowledge about various approaches that have worked, and that haven't, based on earlier educational technology programs in the country.

8. Argentina
Building in part on lessons from early efforts in San Luis province, Argentine projects like Conectar Igualdad and Plan S@rmiento BA (in the nation's capital, Buenos Aires) will eventually be, in aggregate, larger than the one laptop per child initiatives in Peru and Uruguay combined. Given the size and variation of these projects in these three countries, policymakers in other parts of the world seriously interested in learning from the hard won lessons of others before embarking on their own 1-to-1 education computing programs could do worse than to learn some Spanish (not a terrible amount of related information is available in English, let alone other international languages) and reach out to (and perhaps visit with) their colleagues in South America.

9. Portugal
The most ambitious European effort to date to provide students with laptops has been in Portugal. Given its recent history (a member of the European Union, Portugal was itself a developing country not that long ago), lessons from the eEscola project and Magellan initiative may be particular relevant and useful for middle income countries about to embark on large scale 1-to-1 educational computing programs -- especially those that wish to utilize 'public-private partnerships' along the way.

10. ____
As is the practice with lists of ten presented on the EduTech blog, #10 here has been left deliberately blank, as both an invitation for people to tell me what I have missed (or ignored), and as an acknowledgement that my own knowledge of such things is decidedly incomplete.

There are certainly lots of other places to look for inspiration, for best (and worst) practices, for hard-won implementation expertise and (hopefully) for hard data on
costs and impacts. While Mexico recently cancelled a 240,000 unit procurement of laptops for students, this may perhaps be viewed more as a short-term hiccup in longer-term plans. A recent survey of technology use in education across Europe (One laptop per child in Europe: how near are we? [pdf]) highlights the extent to which students in countries like Denmark and Norway, as well as Latvia and Spain, already learn in environments where one laptop/tablet per learner is the norm. Netbooks on the rise [pdf] attempts to survey and distill lessons from across the Europe. Australia, the country that is often touted as having the first 1-to-1 computing initiative (at Methodist Ladies' College way back in 1989 is nearing the end of a program that has seen almost a million laptops distributed to schools while at the same time tablets seem to be quickly gaining ground. (Side note: The Australia-based Anytime Anywhere Learning Foundation (AALF) is a great resource for information on 1-to-1 computing efforts.) The EduTech blog has previously looked at educational laptop efforts in Georgia (the country in the Caucasus, not the state in the American South). A post on lessons from Quebec's Eastern Townships has long been in the queue for publication; those who don't want to wait are directed to related research published late last year.

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Some closing remarks

Most of the large proposals for educational technology programs that come across my desk these days highlight the use of tablets (almost always Android devices, for what that’s worth, presumably for reasons of cost, and because the iPad, the market leading tablet device in OECD countries, does not currently have wide distribution in most middle and low income countries). Rarely (or more accurately: almost never) do I find a compelling reason why tablets are being chosen over laptops (or desktops ... or ... anything else, really). This is not to say that there aren't potentially compelling reasons why purchasing tablets for use in schools and/or by teachers or students might make sense (although seeing hybrid devices, laptops with touchscreens, and tablets with dockable keyboards does leave me confused at times about where to draw the line between various product categories), rather that this technology choice often seems driven by assumption rather than as a result of careful deliberation. Worldwide, the general trend is clear: PCs and laptops are slowly being eclipsed by tablets in the consumer space. I do suspect that what I am seeing in many of the education project proposals I read is in part just the latest manifestation of a long-observed trend that refuses to die: that of simply wanting to buy the latest popular gadget for use in schools. All too often, the related question being asked is not 'what challenges are we trying to solve, and what approaches and tools might best help us solve them?', but rather, 'we know what our technology 'solution' is, can you please help us direct it at the right problems?'

As in other parts of life, in education the answer you get is usually a function of the
question you ask. In the process of attempting to formulate their questions related to the purchases and implementations of huge numbers of new laptops or tablets (or whatever tomorrow's device of choice may be) to help support teaching and learning, hopefully more education policymakers and politicians will take the time and effort to try to learn from the experiences of their counterparts in other countries who have already been down similar paths. While studying lessons, both positive and negative, from some of the countries listed here may not provide them with all of the answers they seek, doing so just might help some of them re-think and re-frame some of the questions they are asking.

Also of potential interest from the EduTech blog:

- Next steps for Uruguay's Plan Ceibal (and other posts about Uruguay)
- The Maine thing about 1-to-1 computing
- Around the World with Portugal's eEscola Project and Magellan Initiative
- Evaluating One Laptop Per Child (OLPC) in Peru
- Assessing education with computers in Georgia
- The Aakash, India's $35 (?) Tablet for Education
- One-to-one computing in Latin America & the Caribbean
- 1-to-1 educational computing initiatives around the world
- Ten comments on 1-to-1 computing in education
- Laptops for education: $10, $35, $100 and points in between (but not above!)

as well as posts related to educational uses of e-readers and mobile phones.

Note: The image used at the top of this blog post ("tablets loom increasingly large on the horizon in many places") comes from the (excellent) Flickr photostream of Adrian Sampson via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution 2.0 Generic (CC BY 2.0) license. The image used near the bottom of this blog post of a whole bunch of tablets of various sizes, shapes and colors ("are tablets the newest cure for what ails education?") comes from the Wikipedian Pöllö via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution 3.0 Unported license.
Using video to improve teaching -- and support teachers
by Michael Trucano
#21: originally published on Tuesday, 27 August 2013

Much of the discussion related to how new technologies can be used in classrooms in low and middle income countries focuses on the use of PCs, desktops and tablets. Less discussed, I often find, is the strategic potential of various so-called peripheral devices, which are (in my experience) typically only considered within the context of how they can be used to enhance or extend the functionality of the 'main' computing devices available in schools.

Many education systems (for better or for worse) have specific 'hardware' budgets, and, when they are looking to tap these budgets to introduce more hardware into schools, in my experience they often look to buy more of what they already have, supplemented in places by things like interactive whiteboards, or networked printers, as a complement to what is already available in a school.

When talking with educational planners contemplating how to use funds specifically dedicated to purchase computer hardware, I often counsel them to think much more broadly about what they may wish to buy with these monies, within a larger context of discussing things like how such equipment can be utilized to meet larger educational objectives, what sorts of training and maintenance support may be needed, and how the use of this technology can complement other, non-technology-enabled activities in a classroom. As part of such discussions, I often find myself attempting in various ways to challenge policymakers and planners to think beyond their current models for technology use.

One general type of gadget that I only rarely hear discussed is so-called 'probeware', which refers to set of devices which are typically used in science classes to measure various things -- temperature, for example, or the pH level of soil, or the salinity of water. Despite the increasing emphasis in STEM subjects in many countries, and what is often a rhetorical linkage between the use of computers in schools and STEM topics, I rarely find that World Bank client countries are considering the widespread use of probeware in a strategic way as part of their discussions around ICT use in schools. That said, one suspects that such an interest is coming, especially once the big vendors direct more of their attentions to raising awareness among policymakers in such places (much like the interactive whiteboard vendors began to do a half-decade or so ago).

While probeware is a new type of peripheral for many education policymakers,
there is another peripheral that policymakers are already quite familiar with, and which is already used in ad hoc ways in many schools, but which rarely seems to be considered at a system level for use in strategic ways. Once you have a critical mass of computers is in place, and in place of buying one additional PC, might it be worth considering (for example) utilizing video cameras instead? Video can be put to lots of productive uses (and some perhaps not-so-productive uses). Considering three concrete examples from around the world may shed some light on how video can be used to improve teaching -- and support teachers.

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A number of years ago the World Bank began supporting a study to examine teaching practices and activities in Indonesian classrooms. At the heart of this work has been the use of video to document what is actually happening in (a set of 100) classrooms across the country which participated in the 2007 Trends in International Mathematics and Science Study (TIMMS), the fourth iteration of a well-known global effort that takes place every four years. (Many people may be more familiar with a similar ongoing multi-country study, the Programme for International Student Assessment, or PISA.)

Back in 2010 the World Bank released the first results of this work. Inside Indonesia's Mathematics Classrooms: A TIMSS Video Study of Teaching Practices and Student Achievement utilized methodologies and approaches pioneered in earlier work in seven other countries in the hope of being able to draw useful insights based on comparisons with practices in other countries that could inform teacher reform efforts in that large Southeast Asian nation.

The decision to use video to document what was happening in classrooms was made after a careful consideration of a number of other, perhaps more ‘traditional’ approaches (e.g. teacher interviews, teacher questionnaires, live classroom observations) used by researchers to document and analyze what goes in inside schools. As the study authors note,

The video study approach provides many unique advantages for understanding classroom activity. Video study is [like live classroom observation] also an intrusive methodology, and some argue that it may be even more intrusive than live observation, especially when it is done in a community where video-taping is not common. But experience has shown that while students (and their teachers) may be distracted by the video-taping equipment in the beginning of the lesson, this distraction may lapse soon after the lesson begins; if video-taping is done in consecutive lessons, then the effect of the presence of the camera is negligible from the second lesson onward. In this sense, videotaping may be less intrusive than live observation, especially if the latter involves more than one observer.
The advantages of video study are many and make it an extremely powerful methodology for studying the instructional practices of teachers:

a. Different observers may focus on the same video as the basis of a shared analysis. This increases inter-rater reliability, and if the required level of reliability is not achieved initially, further training of observers may be conducted to increase the reliability.

b. The use of multiple cameras may allow different aspects of the classroom to be captured simultaneously, and synchronization and the use of a mixer will enable the different aspects to be related to each other.

c. Since the videos are permanent records of classroom activities, multiple analyses may be performed. The videos may be analyzed repeatedly, at any time and in any place.

d. The videos may be paused, rewound, fast-forwarded, etc., for further analysis.

This approach used was not cheap (related costs are detailed in appendix 6 of this publication) and it required a fair amount of technical expertise to pull off successfully. Each of the five video study teams included two technical people: one to operate a camera to follow the actions of a teacher (a second stationary ‘whole class’ camera was used as well) and one to do on site editing of the results from the two cameras. A third person took notes. According to the study authors, doing things in this manner “cost significantly more than other methods of gathering data such as interviews, questionnaires or classroom observation”, but the results have offered valuable insights to policymakers leading related teacher reform efforts at the Ministry of National Education.

While this effort was on-going, another effort to document teacher activities in Indonesian classrooms using video was taking place, supported by USAID. This effort utilized video in a number of different ways, to different ends, than what was done with the TIMMS study. One component of this work (under the DBE2 project) focused on using low cost video to as part of classroom observations to support teacher self-analysis and reflection. Small, inexpensive (less than US$50) consumer grade video cameras (like the now-discontinued Flip cameras) were preferred because of their cost and ease of use (no technical training required). The resulting video may not have been of broadcast quality, but it was plenty good enough for the

how am I doing? (and what do I look like when I am doing it?)
purposes of the project, which paired teachers with coaches to review video of how teachers conducted their lessons and interacted with students in their classrooms. This sort of low cost, low stakes (teachers were not formally ‘graded’, and video captured was not part of any sort of formal review of teacher capabilities by educational authorities) interaction with a peer to examine one’s own teaching can be quite powerful.

I remember the first time I heard my voice recorded on an answering machine message. I swore that I didn’t actually sound like that -- even though I had to concede that the other voices I heard did in fact sound exactly like what I heard on the tape! The same sort of phenomenon was experienced by many teachers in this project in Indonesia, who, by viewing how they looked and acted in the course of their normal classroom duties, were able to see their teaching from a new perspective, critically self-assessing their own individual ‘performance’ in the process. This method of catalyzing and enabling self-reflection has been used profitably in many other places (in addition to the United States, where such things have happened for quite [pdf] some [pdf] time, efforts of this sort have taken place in countries as diverse as Namibia, Macedonia and Liberia) as a tool for teachers themselves to improve their own teaching practices, both as a result of what they learned about themselves, and from interaction with peers who were also using video to analyze their own teaching.

For policymakers looking for ways to use ICTs to help improve teaching, utilizing low cost video cameras in this way can be a very cost-effective investment – especially when compared with many of the much more complicated and expensive approaches (buying all teachers a laptop, for example, or outfitting a new school computer lab) which are meant to achieve at least some similar sorts of objectives. This is not to say that such things are mutually exclusive, nor that programs to support laptops for teachers or school computer labs are misguided (although, at least for the last option, some skepticism might in some cases be in order). Rather, it is to suggest that computer- (or laptop- or tablet-) centric considerations of how to utilize information and communication technologies might preclude contemplation of some other useful approaches. In the case of low cost video recording, the fact that many low end feature phones (let alone smartphones!) already in the hands of teachers have basic video recording capability only adds to the potential feasibility of doing this sort of thing.

(Teacher self-analysis isn’t the only thing you can do with low cost video cameras in classrooms to help support teachers, of course. The DBE2 project explored a whole suite of complementary activities and approaches which took advantage of the availability of cheap, easy-to-use handheld video recording devices, including virtual ‘bug-in-the-ear’ support, where a teacher with Bluetooth earpiece received live coaching advice in real time; two-way Skype-enabled co-teaching of classes; the posting of teacher videos for peer comment; and the creation of ‘video portfolios’ documenting the work of teacher coaches.)

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I once toured a school in Asia that was touted as doing 'transformative things with technology'. When visiting such showcase sites -- especially when accompanied by officials from government ministries -- I am under no illusion that what I am seeing is necessarily representative what is happening in other schools -- or indeed, representative of what happens in the school in question when an 'international visitor' and his/her official government minders are not around. Still, there is no substitute for experiencing things firsthand, however staged they may be.

On this particular occasion, I was talking with a very dynamic, and fast walking, schoolmaster. This fellow walked so quickly that we eventually left the rest of our official, and rather large, entourage behind. As we breezed by one open door I paused and, seeing a room with a bunch of computer monitors inside, stopped and asked what was in there. 'This is actually our best use of technology', the schoolmaster said (I am paraphrasing here, as I will for the duration of this anecdote, the specifics of which are dulled a bit by time and my lack of fluency in the local language). 'I am not sure why it is not on your itinerary to see.' I asked to see it anyway and, as it was just the two of us at that point in the tour, we ducked in the room, which he was quite eager to show me. I saw about eight or so TV monitors lined up, each showing a live feed from a classroom in the school. 'This is the best teacher evaluation and support tool ever invented', I was told. 'Watch this.' And watch I did, as the schoolmaster pointed to a screen a flipped a switch. 'Stand up straight, and speak louder', he barked into a microphone. The teacher on the screen complied and continued teaching his class. After some additional back and forth, we moved to another screen (and classroom).

After listening to a history teacher lecture for a minute or two (none of which I understood), the schoolmaster interrupted, correcting her on what he told me was a factual error, and then instructing her (I was told) to relate a specific historical anecdote. In another classroom, a few students were directed to get up and say something in English, as 'an international visitor is watching'. The principal asked me how good their English was, and said I should correct them if they made a mistake, as this was the only way they would learn. Rather uncomfortable with the whole situation, I spoke into the microphone and complimented the students, and their teacher, on the excellent quality of their spoken English. After watching this stuff for about fifteen minutes, by turns appalled and fascinated, our official entourage caught up with us and I saw my official ministry of education guide blanche when he saw what I was seeing. My impression then (and now, upon reflection) was that he had deliberately not wanted to show me this 'innovative' use...
of technology, out of fear that I would not be a big fan -- and would probably tell others about it (which I am obviously doing here, although I have not named the school, or indeed even the country).

With the cat out of the proverbial bag, we talked about the use of video cameras in the classrooms in the school. The schoolmaster was totally convinced of the efficacy and power of video technology to improve teaching -- and indeed, to motivate teachers. 'As schoolmaster, I am responsible for overseeing and mentoring all of the teachers in my school', he said. 'The teachers like it when I can help them improve. I can't be in all of the classrooms but with this technology I can quickly monitor and support many teachers during the day.' I later talked with a few teachers about this use of video (which I just admit I found rather startling, to say the least, and certainly not something I would ever file under 'good practice'). Some sample comments: 'Schoolmaster ___ wants to support us in everything we do. The use of the video system helps us to become better teachers and make sure that we do not teach our students incorrect things or teach in ineffective ways.' and: 'It is my duty to teach correctly. When I do not do so, our students may not do well on the exams and then that would not be fair.'

My strong sense at the time was that such statements were, for the most part, genuine, especially when they were expressed by the younger teachers. Opinion wasn't universal -- one of the more senior teachers, if memory serves, said something similar, but his manner suggested to me that he didn't entirely believe what he was saying, but that he knew what he was expected to say when talking about this sort of thing with a visitor. Generally speaking, however, this practice was seen to be a good thing. (The fact that the schoolmaster seemed to be quite popular among the teachers probably didn't hurt.)

When I was teaching, I most certainly would not have been happy being observed in this manner, and especially not if I would be corrected in front of my students in such an immediate and public way. I mentioned this, and commented that the use of technology in this manner may not in fact be 'transformative', as the school's use of new technologies had been described to me. In contrast, many people might say that it supported existing pedagogical paradigms, and so was the exact opposite of 'transformative'. (Left unsaid, out of respect for my hosts and a recognition that making such comments might serve more to make me feel somehow 'superior' than to help improve things in some tangible way, was my belief and hope that many 'traditional' teaching practices should be changed, and that introducing new technologies could be one trigger to help change them.) I was told in response that I did not understand the situation. The fact that the schoolmaster could monitor and support teachers in this manner was indeed 'transformative' for the way teachers conducted their lessons, and that this transformation was indeed a positive thing. Fair enough (I guess).

It *is* true, I should probably add, that we had observed via the closed circuit video system a teacher reading a newspaper at his desk. 'Stop reading the newspaper and start teaching', the schoolmaster had commanded via the intercom, and the teacher had immediately popped up and started lecturing to the class.
'Teacher ___ is lazy', the schoolmaster told me. 'He is always reading the newspaper when he should be teaching. It is important that I motivate him to become a better teacher so that the students learn and can pass their tests.'

My intention in relating this anecdote here about the use of video in one particular school is not to criticize what I observed.

- I have told this story to many different audiences in many different countries over the years, and have seen it -- not surprisingly -- heavily criticized in some quarters (by educational researchers in the United States, for example, and by teachers in Germany).
- I have also seen it celebrated. After relating this story in meetings in one Southeast Asian country, for example, I was asked by school principals what it would cost for them to set up such a system in their schools (and if the World Bank could help them do so!). One education minister from another part of the world even told me that it was one of the best uses of technology in a school setting that he had ever heard about.

Rather, it is to highlight the fact that the adoption of new technologies in schools is, at least in my experience, not always as immediately 'transformative' in ways that some of the most impassioned educational technology advocates may desire, as such adoption is almost always constrained (or in some cases, enabled) by preexisting social norms and pedagogical traditions. (Such a statement may seem so obvious that it does not even need to be made, but in my experience in working with the use of educational technologies, it is quite often worth repeating some things that may at times be considered 'blatantly obvious' to outsiders or newcomers to the field, especially where the 'insiders' are so entranced with the technology themselves that larger perspectives fade into the distance.) That said, the more technology is put directly into the hands of students and teachers themselves, the greater the likelihood that some of them will find novel (perhaps even subversive) uses for such technology that are indeed transformative -- in a good way. Whether the benefits of doing this outweigh the costs will depend on the context.

Rigging up expensive closed circuit television systems is, perhaps, one potential way to utilize video to help teachers improve their teaching. Bringing in trained videographers to record teachers in their classrooms, and having the results analyzed by external evaluators, is another. (It should be noted that certain [pdf] schemes of this sort may be lightning rods for controversy.) Giving teachers low cost video cameras so that they can film themselves teaching -- and then review the footage themselves, possibly together with their peers in informal settings -- is still another option. Some approaches to using video to improve teaching, and support teachers, can cost a lot. Others: not so much. The results can be different too.

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A final question: This morning I read a recent post by Mary Burns on the GPE blog, *If We ‘Text’ It, Will They Learn?*, which explores how mobile phones can deployed to support teacher professional development, especially in low income countries. In
the blog post, a quite useful chart lists various 'features' of mobile phones, how these features can support teacher learning, and then provides a few related real-world examples. The final feature listed is 'video', and mention is made that "teachers can share video examples of a procedure they are trying out in class" and "teachers can view video examples of desired practice". However, I find it interesting that no concrete examples are listed of projects that actually are doing these things. Anecdotally there is of course evidence of this happening in ad hoc ways in certain places (including, for what it's worth, within the context of the DBE project in Indonesia), but I am unaware of any project that is seeking to use phones systematically in this manner. If anyone knows of examples, please feel free to add them in the comments section below. I would love to be able to cite such practical examples when discussing with education policymakers the potential to use video to support teachers in schools. Once, when I seemed to make some progress in this regard, I was told in response that, while this seemed like an interesting idea, the ministry of education had already purchased digital cameras for use in schools in a previous project. Many had been stolen, however, and so the finance ministry would be leery of any new project that sought to purchase lots more of them. That's unfortunate, I replied. But have you considered the fact that many of your teachers already have video cameras in their classrooms? They are built into their phones. Perhaps you might consider a small pilot project using the technology that some teachers already have, know how to use, and will ensure will not be stolen, as a way to demonstrate proof-of-concept, both to yourselves and the ministry of finance, in a very low cost way?

Note: The image at the top of this blog post of two African students using an inexpensive Flip camera ("smile and say 'PISA!'") comes from Erik Hersman. Discovered using the Creative Commons search tool, it comes via Flickr and is used according to the terms of its Creative Commons Attribution 2.0 Generic license (CC BY 2). Those not familiar with Hersman's work may wish to check out Afrigadget, a great website he founded that is "dedicated to showcasing African ingenuity". The second image is a screenshot of the cover of the World Bank publication "Inside Indonesia's Mathematics Classrooms : A TIMSS Video Study of Teaching Practices and Student Achievement", which is available via the World Bank's Open Knowledge Repository. The third image ("how am i doing? (and what do I look like when I am doing it?)") is of a classroom supported under the Decentralized Basic Education project in Indonesia. It was located via a blog post on the USAID website, New Teaching Methods and Resources Transform Indonesian School. As it comes from USAID, it is in the public domain. (USAID, by the way, maintains a small repository of its public domain images for free download.) The last image of a sign in German noting that an area is under video surveillance ("good news -- you are being watched!") comes from the Wikipedian Warmito (actually a married couple) via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license.

Many thanks to Mary Burns of EDC (whose book Distance Education for Teacher Training: Modes, Models and Methods is an invaluable source of practical examples of how ICTs can be used to support teacher professional development) for related background information and insights.
Calculating the costs of digital textbook initiatives in Africa
by Michael Trucano
#22: originally published on Wednesday, 25 September 2013

A few countries across Africa are considering rather ambitious initiatives to roll out and utilize digital textbooks, a general catch-all term or metaphor which I understand in many circumstances to be ‘teaching and learning resources and materials presented in electronic and digital formats’.

How much will such initiatives cost?

Reflexively, some ministries of education (and donors!) may think this is a pretty straightforward question to answer. After all, they have been buying textbooks in printed formats for a long time, they have a good handle on what such materials traditional cost, and so they may naturally presume that they can think about the costs of ‘digital textbooks’ in pretty similar ways.

Many people are surprised to discover that calculating costs associated with the introduction and use of digital teaching and learning materials is often a non-trivial endeavor. At a basic level, how much an education system spends will depend on what it intends to do, its current capacity to support such use – and of course what it can afford. As they investigate matters more deeply (and sit through many presentations from publishers and other vendors, sometimes wowed at what is now possible and available while at the same time rather confused about what is now possible and available), education officials seeking to acquire digital teaching and learning materials for use at scale across an education system may find costing exercises to be, in reality, rather challenging and (surprisingly) complex when compared to their ‘standard’ textbook procurement practices.

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Many countries (sensibly) support a few small pilot projects to introduce digital teaching and learning materials as a way to learn (among other things) what the related costs are. Unfortunately, experience has shown that costs associated with piloting a discrete digital educational materials initiative may not easily correlate
with the costs of such a project at scale, and so simple projections of costs based on experiences with pilot projects may result in calculations that are inaccurate – potentially wildly so. This isn’t to say that such pilots are not useful – they certainly are! – but only that their limitations should also be acknowledged. In some cases, costs of certain project components should be expected to decrease at scale as a result of various economies of scale inherent in things like the bulk purchasing of goods (textbooks, computers, etc.) or services (technical support, bandwidth). Other cost components – such as the need for increased coordination, expenses associated with assuring that the needs of students with special needs are met, the necessity of revamping existing policies and procedures -- may only emerge when a project to introduce digital teaching and learning materials is pursued at scale.

When initially attempting to identify and quantify such costs, it may be helpful first to consider grouping them into three broad components or cost categories. (Specific cost figures themselves may vary widely by market and jurisdiction, so this general blog post will feature no actual numbers – sorry about that.) The first two categories or components – the cost of the content itself, as well as device costs related to hardware necessary to use this content – are commonly (if often incompletely) considered. A third cost – related to the development and sustaining of a necessary ecosystem to support the use of digital teaching and learning materials – can in some circumstances be just as important, but often does not factor fully (if at all) into initial cost calculations.

In general, it is important to note that methodologies which can help identify, estimate and compute total cost of ownership/operation (TCO) over time, and not just upfront capital costs, should be employed when attempting to assess, estimate and quantify costs related to the procurement and use of digital teaching and learning materials.

**Content-related costs**

Costs related to the acquisition of digital teaching and learning materials are often easy to understand at a basic level, and may be calculated in ways that are roughly similar to how those of traditional textbook procurement are calculated. Indeed, on its face, isn’t buying a digital textbook much like buying a printed textbook? (Some potential answers to this: **Maybe. Sort of. Not at all.**)

Where digital educational content is acquired from vendors, it may be offered in a variety of ways:

- It may be **sold** for use over a given period of time, or in perpetuity. It is worth noting that this content may be offered for sale separate from the related intellectual property rights (as is typical), may be made available under joint IP (less common, more expensive), or the IP may be transferred...
to the education system outright (rare -- unless mandated by government, and usually expensive)

- It may be offered as a subscription service.
  In some such cases, a vendor may propose to off-set certain costs through the use of embedded advertising.
- It may be bundled with other goods or services. For example, content and devices may be sold (or leased) together, possibly with a given level of technical support and maintenance. A vendor may offer to provide related training (e.g. for teachers or technical support personal).
- Notably, and increasingly, a vendor may offer to sell or lease the content embedded within a larger digital content or learning management system (typically referred to as a CMS or an LMS). When doing so, it may offer to host the content on its own servers. It may offer to embed an education system’s existing digital content, including potentially content from other vendors, into this CMS. (Where a vendor offers not only content itself, but to provide a content or learning management system as well, it may or may not make available the source code of this content management system or offer and easy migration path should an education system decide to move this content to another CMS. Associated costs in this regard will need to be considered as well.)

Last year I spent some time with education officials in a country outside Africa to help them work through what seemed an almost bewildering array of related options that one vendor was proposing to an education authority. As technologies and business models continue to evolve, one would expect that many more combinations and permutations will emerge as well.

An education system may of course wish to develop digital teaching and learning content itself by expanding its existing in-house capacity to develop educational content. Costs associated with this approach vary widely, based on the context, but they can be considerable. Experience of some countries that have followed this path has shown that quality may vary widely as well, but that is a separate issue, as is the fact that there are very real ramifications of a decision to go this route on the potential viability and health of local educational publishing industries.

Many education systems in Africa are increasingly considering the use of “free content”, especially so-called ‘open educational resources’ made available for use and re-use without cost. Where ‘free’ educational content is used, the costs of the acquisition rights to use the content is zero.

Some education systems consider, in part, the use of user-generated content, i.e. content created by teachers and students themselves. In such cases, initial acquisition costs may be quite low, provided the capacity exists for teachers and students to be able to develop this content. Where this capacity does not exist, investments may need to be made (in training,
in facilities to develop the content) in order to be able to acquire this ‘free content’. Where user-generated content is meant to be an important component of an education system’s digital content acquisition strategy, clear policies and guidelines should exist related to the related intellectual property. (Is it, for example, owned by the education system itself, or owned by the creator but usage rights are granted for free to the educational system or where the content is used for education purposes?)

No matter how content is initially acquired and paid for, there may be additional costs related (among other things) to:

- **Vetting** the content for accuracy, appropriateness given to local contexts, customs and cultural mores, and its relevance to existing curricula;
- **Contextualizing** this content as appropriate or necessary;
- **Embedding** this content within an education system’s existing content or learning management system;
- **Classifying** or tagging individual content items according to a given metadata scheme, in order to signifying attributes like ownership, usage rights, links to curricular objectives, data formats, content types (e.g. text, image, audio, video), etc.; as well as
- **Distribution** (whether physical, digital, or some combination of the two) and inventory management.

It is important to note that these costs may exist whether or not an education system decides to purchase content or uses ‘free' resources. Indeed, in some cases the costs related to these sorts of things may be effectively embedded in the price of the 'digital textbooks' that publishers and other vendors provide. Whether or not this premium is worth paying will depend on the context or circumstance – but is important to acknowledge that, whether embedded or explicit, such costs typically exist.

These additional cost components are not unique to digital educational content, of course. Some ministries examine these sorts of cost components related to both printed and digital materials, as part of efforts to compare them. This can be a valuable exercise. That said, it is important to note that this is not really an ‘apples to apples’
comparison. When you are doing something digitally, you are often doing something -- in fact many things -- that are quite different than is the case when utilizing only traditional printed materials.

Consider, for example, calculations of costs associated with user-generated content. However an educational planner may decide to run the numbers, it is worth noting that, when students or teachers themselves are developing content, there is value in the process itself beyond what is 'produced' at the end. Indeed, experience with a few past initiatives that we supported at the World Bank in Latin America and Africa that sought to provide teacher-generated content, the greatest value was in the end not seen in the quality of the content produced and its usability across the education system (in some cases, the content itself was rated quite poorly against such metrics), but rather as a mechanism for continued professional development of teachers, whose understanding of and use of educational materials in some cases changed quite dramatically after they themselves had turned from consumer into creator. How much, or how little, value an education system may wish to assign to this is a topic of reasonable debate – but planners would do well not to deny that such value exists.

It should also be noted that, at least in the short run or in the early stages of the use of digital teaching and learning materials, these costs will be in addition to costs associated with the use of traditional printed materials in cases where digital materials are not meant to fully replace printed materials.

Device-related costs

One cost category that is easy to understand, and typically (increasingly) reasonably well understood, is that of the end user device on which digital teaching and learning materials are viewed or utilized, together with the necessary supporting technical infrastructure. Important considerations when attempting to calculate costs related to end user devices include the projected useful life of the device itself; the need for equipment repair, maintenance and replacement; and non-content software purchases, security and upgrades. In addition, there will be costs related to the distribution of the devices themselves and, often, training for end users. There may well be additional costs related to maintaining a baseline level of electricity in order to ensure that the devices themselves can operate. In environments without access to reliable electricity, costs related to the provision of things like local generators and/or solar chargers may need to be considered. TCO -- total cost of ownership (operation) -- tools are increasingly available to help calculate such costs.

It may be that, for some education ministries, device costs do not factor into costing exercises related to digital teaching and learning materials, as such costs are (as one official once lectured me) 'more appropriately assigned to other budgets'. Fair enough – but that only means that such costs are shifted to others, not that they have disappeared.
Ecosystem-related costs

In addition to costs related to digital teaching and learning materials themselves, and the devices on which such content is meant to be viewed, used or delivered, there are a number of costs related to the ecosystem in which such use occurs. Depending on the specific context, and the technology or technologies employed, these costs can be negligible – or considerable.

- When buying textbooks, little impact is typically seen on budgets for school infrastructure. This may not be the case for the use of digital teaching and learning materials. The physical plant of a school may need to be improved to ensure adequate climate control (proper temperature, humidity, and dust levels), adequate physical security, and electrical capacity. Rooms themselves may need to be reconfigured; additional furniture may need to be purchased; and support equipment (e.g. charging stations, laptop carts) may need to be purchased and installed.

- At a system level, additional costs may need to be incurred related to coordination of initiatives featuring the use of digital teaching and learning materials. This relate both to the coordination of the initiatives themselves, coordination with other initiatives inside or across various government programs or ministries, and coordination with various actors and stakeholder groups outside government (notably, civil society, academia and the private sector). National or regional public relations or information dissemination campaigns linked to the introduction of new digital teaching and learning initiatives are also not uncommon. Additional training and outreach activities (including not only for teachers and learners, but also for e.g. school principals and local community groups) may be required. Where connectivity is considered essential for the success of an initiative, related costs will need to be considered, as will potential upgrades to the electrical grid to enable this connectivity and to power the devices themselves.

- More fundamental in some cases – and often overlooked in many developing countries – is the need for a vibrant set of local actors who can provide related products, services and support. The existence of healthy and competitive local publishing and technology industries, for example, may be key prerequisites for success if the use of digital teaching and learning materials is to become integral to the functioning of an educational system. In addition, the use of digital teaching and learning materials at scale may bring with them the need to formulate (or re-formulate existing) policies, guidelines, laws and regulations in various ways, especially related to things like data security and privacy.

It is important to note that some or many of these larger system-level or ecosystem costs may traditionally lie outside the budget, or indeed outside purview or responsibility, of ministries of education, but may or will need to be incurred in some way by some entity.

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My hope in writing this blog post is not to argue what sorts of costs related to the acquisition and use of digital and teaching materials in education systems across Africa may be most important to consider and calculate. Rather, it is to highlight a
few (there are others) types of costs and cost categories that may not, in my experience, be considered at all.

As in the rest of the world, most of the headlines across Africa related to the use of digital technologies in schools focus on the various cool new gadgets and devices that are being introduced. If related experiences from other parts of the world provide any lessons, however, it is that, as the devices themselves proliferate, evolve and become cheaper, it is usually the content, not the container, that is in the end more important. The costs to acquire, maintain and replace the devices themselves can be quite substantial. The political will required to mobilize funding for device-centric initiatives alone might well exhaust the appetite of taxpayers (or the ministry of finance). That said, however much is spent on hardware, neglecting to fully consider and budget for costs related to the content that will ultimately help realize the value of massive investments in (take your pick) computers, laptops, tablets, interactive whiteboards may yield a result that is penny wise, pound foolish.

You may also be interested in the following EduTech blog posts:

- Textbook policies in an increasingly digital age
- Textbooks of the future: Will you be buying a product ... or a service?
- E-Reading in Africa
- An update on the use of e-readers in Africa
- What happens when all textbooks are (only) digital? Ask the Koreans!
- Mapping Open Educational Resources Around The World
- More on e-books in Africa
- Can eBooks replace printed books in Africa? An experiment
- What Are the Costs of Not Investing in ICTs in Education?
- Education & Technology in 2025: A Thought Experiment

Note: The image used at the top of this blog post of a bird burying its head in the sand ("it can be hard at times to see what's coming") is adapted from an image from comes from the Wikipedian Korall via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution 3.0 Unported license. The second image of an inspirational poster reminding everyone to help cut costs ("seems a rather sensible idea ...") comes from the U.S. National Archives and Records Administration (ARC Identifier 534247) and is in the public domain.
Across Africa, a variety of devices are increasingly being used to disseminate and display teaching and learning materials in electronic and digital formats. As costs for such devices continue to fall, and as the devices themselves become more widely available and used across communities, the small pilot, and largely NGO-led, projects that have characterized most efforts to introduce educational technologies in schools across Africa will inevitably be complemented, and in many cases superseded, by large-scale national initiatives of the sorts now taking place in Rwanda and Kenya, where hundreds of thousands of devices are being, or will soon be, distributed to schools.

Few would argue that the use of such devices do not offer great promise and potential to improve the access to and quality of education by providing access to more educational content than is currently available inside and outside of schools. Internet connectivity can provide access to millions of educational materials available on the Internet; low cost, handheld e-reading devices can hold more than a thousand books. Depending on the availability of connectivity, or local resourcefulness in transferring materials to devices manually, digital content used in schools can be updated more regularly than is possible with printed materials. Depending on the device utilized, this content can be presented as ‘rich media’, with audio, video and animations helping content be displayed in ways that are engaging and interactive. It is possible to track electronically how such content is used, and, depending on the technologies employed, to present content to teachers and learners in personalized ways. In some cases, this content can be delivered at lower costs than those incurred when providing traditional printed materials.

Given the increased availability and diffusion of consumer computing technologies across much of the continent in less than a decade, it is perhaps not surprising that a number of widespread misconceptions about the promise and potential of using digital technologies and devices across Africa to increase access to learning materials appear to have taken hold. On one level, this is consistent with the ‘hype cycle’ model of technology diffusion in which, according to Gartner, a technology
breakthrough is soon followed by a period of time of “inflated expectations” about what sort of changes might be possible as a result.

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Common myths and misconceptions may be formed and spread for a variety of reasons. They may in some cases seem entirely logical, and reflect general beliefs widely held. They may be widely disseminated – sometimes by groups with a vested interest in having them believed without too much related discussion or investigation. And, at some level, some of us may, deep down, simply want to believe them. In all of these cases, one important reason that they persist might be that they contain grains of truth, or that they may be quite accurate in certain circumstances – but not others.

Some of the common myths and misconceptions related to the (potential) use of digital teaching and learning materials across Africa include:

“Africa is simply not ready for digital teaching and learning materials”
The challenges facing many education systems in Africa, to say nothing of the needs of learners themselves, are often considerable. That said, let’s also note that sweeping generalizations of this sort about a continent of 54 countries (as well as a few territories and protectorates), while perhaps rhetorically convenient for some politicians and headline writers (and the occasional blogger as well!), aren’t terribly useful in informing policies and practices in any useful way, ignoring as they do the diversity of educational contexts across ‘Africa’ (from country to country – and inside countries as well). Even should we choose to adopt such a construct, there is no denying that there are lots of places where digital teaching and learning materials have been in use in various ways – in some cases for quite a while. (In its own modest way, the EduTech blog itself exists in part to help document and explore some of these cases.) The use of low-cost e-reading devices, of computers and laptops and national educational portals – while these may not be the norm for most students, they are a reality for many. Whether certain places where such new technologies are in use at the school level (in some cases for over a dozen years or longer) are ‘ready’ or not, there can be no denying that this sort of thing is indeed happening – and there is no evidence that this particular genie can ever be returned to its bottle.

“We will cut costs by ‘going digital’ with our textbooks”
Many people cite the falling costs of devices such as e-book readers as a reason to be optimistic about the potential for the widespread adoption of e-readers in education systems in Africa. Such optimism is certainly not misplaced. While the costs of end user devices will no doubt continue to fall, however, such costs may in the end represent only a fraction of the overall costs to an education system of providing access to digital teaching and learning materials, which also include things like content distribution (including connectivity), digital content production, and ongoing support and maintenance. Where a country is not already home to a vibrant ecosystem of diverse companies and actors which can enable and support the quick diffusion and use of a particular technology for education purposes – and, outside of perhaps South Africa, no African country has a ‘mature’ ecosystem of this
sort already in place – this ecosystem may need to be developed.

“**The content we need is already available – and free**”

It is certainly true that there is a lot of educational content in digital formats available for potential use in African education systems without charge. As with the falling costs of end user devices, this is cause for legitimate optimism and excitement. However, even where such content is ‘free’, and of high quality (however defined), it is worth considering that there are potentially many costs that must still be incurred if this content is to be usefully made available to teachers and students. This content needs to be identified. It will need to be vetted for accuracy and appropriateness, and possibly contextualized for use within a given educational system. This content may need to be mapped against existing curricular objectives, and presented in such a way that the correspondence between individual content items and a given subject curriculum are clear to teachers and students. Where gaps exist, additional content may be required. It may need to be organized and presented in ways that are user-friendly. Teachers may need to be trained in the use of such content, and supported over time in ways that were not necessary (or apparent) when only printed textbooks were used. In addition, the content itself will need to be distributed to devices. Where this distribution cannot be done digitally – i.e. where no or insufficient connectivity exits – other means will need to be employed. Where digital distribution is technically possible because of the existence of adequate connectivity, there may still need to be investments in content management and distribution systems to enable this to occur.

“**Digital learning materials will engage and motivate our children**”

A common rationale advocating for the use of digital teaching and learning materials is that such materials are, in and of themselves, naturally motivating for students, and so will increase natural motivation for learning. Beyond an initial stage of excitement that typically characterizes the deployments of new technologies in schools, the research literature is decidedly mixed on the extent to which digital materials motivate students to learn, and the extent to which this motivation results in better learning outcomes. The devil is in the details here. Some content may motivate learners, some approaches to the use of this content by teachers may motivate learners – and others may not. Such rationales are often linked, explicitly or implicitly, to the concept of young people as ‘digital natives’, i.e. that youth are increasingly living in a world where technology use is the norm, and they naturally take to and understand how to integrate the use of technology as part of their learning. This concept, while perhaps attractive on its face, has occasionally much scholarly debate and, to the extent that it is a useful construct, is much more nuanced than many of its proponents may suggest.

“**E-books can simply replace our textbooks**”

As Nicholas Negroponte has famously opined in Being Digital, “the change from atoms to bits is irrevocable and unstoppable.” That said, while it might eventually be true that digital textbooks will eventually largely replace printed textbooks, this transition will take many years. In education systems in OECD countries where digital learning materials are already in widespread use, traditional printed textbooks are still used extensively. This suggests that, for an indeterminate period
of time, even in the education systems best-equipped for the transition to the use of digital teaching and learning materials at a wide-scale (a category to which few education systems in Africa, with the possible exception of South Africa, would belong), a simple substitution of digital for printed materials will not be viable in the near term. Even where and as this ‘replacement’ becomes possible, 100% substitution is unlikely. Even the most devoted digital enthusiasts concede that there are certain affordances of the technology of the printed book (its portability, longevity, ability to be physically altered, ability to function without electricity) that may not be at hand when using e-books and other digital teaching and learning resources. Replacing the printed with the digital is not a simple ‘apples to apples’ comparison. When utilizing digital learning materials, you are often doing something -- in fact many things -- that are quite different than is the case when utilizing only traditional printed materials. Plans and policies meant to facilitate the simple replacement of printed with digital educational materials may not fully allow education systems, and the students and teachers who are at the heart of such systems, to take full advantage of the potentially transformational affordances that are available when materials are presented in digital formats. The inadequacies of this comparison go both ways, however; some currently proposed policies and plans meant to do away with printed materials completely may be missing part of the larger picture as well.

“If we don’t act now, we will fall behind”

One common theme that animates many decisions to explore the use of digital teaching and learning materials is that education systems which do not embrace the use of technology will ‘suffer’ in comparison to those in other countries, and the competitiveness of the country itself may be eroded over time as a result. Rhetoric of this sort is often invoked by politicians to garner support for related initiatives – aided in some instances by vendors eager to provide ‘solutions’ to ‘problems’ that policymakers have not always clearly defined, or perhaps even in some cases understood. While there may be some truth to such worries, there is often a danger that such concerns can lead to hasty, ill-conceived or inadequately considered plans to quickly introduce new technologies into schools. Decisions about the introduction of, or transition to, the use of digital teaching and learning materials are not ones to be taken lightly, or quickly. **Recommending caution and deliberateness, however, should not be confused with advocating for inaction.** Even where such things may be beyond the practical reality or pocketbook of a country’s education system today, the use of digital teaching and learning materials are worth considering as part of scenarios for medium or long term planning in all education systems across the continent. This is especially the case when ‘business as usual’ is not working – and isn’t expected to work going forward either. New technologies offer exciting new opportunities to provide access to teaching and learning resources that were not previously available, sometimes at costs lower than those absorbed when doing things the ‘traditional way’. However attractive is may be to consider how a country may ‘leapfrog’ ahead as the result of its adoption and integration of new technologies, it is worth remembering that it is also possible to ‘leapfrog in the wrong direction’.

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Myths are powerful – and important. What is believed can be a more powerful animator of policy decisions than what can be demonstrably proven, let alone what is ‘true’. Taking some time to reflect on some of the common myths and misconceptions that, wittingly or not, inform decisions about the use, and potential use, of digital teaching and learning resources in schools and education systems across Africa might help to create an environment where there is more space for considered deliberation amidst lots of related (and often understandably exciting) hype on the one hand, and unproductive, reflexive skepticism on the other.

A previous post on worst practice in ICT use in education noted that, while most if not all of such practices may seem so obvious that they need not even be mentioned, this 'obviousness' hasn't stopped them from occurring (and re-occurring) around the world with depressing regularity. Attempts to separate the hope from the hype around the potential use of digital teaching and learning materials often end up confronting sets of myths and misconceptions that may in some cases be commonly disseminated, and in other cases left unspoken but widely believed. Please feel free to use the comments section below to note some of the common myths and myths conceptions in this area that you see which you feel might be worth sharing and commenting on.

You may also be interested in:

- E-Reading in Africa
- An update on the use of e-readers in Africa
- More on e-books in Africa
- Can eBooks replace printed books in Africa? An experiment
- Textbook policies in an increasingly digital age
- Textbooks of the future: Will you be buying a product ... or a service?
- Calculating the costs of digital textbook initiatives in Africa
- Mapping Open Educational Resources Around The World

Note: The image used at the top of this of one perspective on the skyline in downtown Nairobi ("attempting to see just over the horizon") comes from the Wikipedian Stephenwanjau via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license.
Investing in digital teaching and learning resources: Ten recommendations for policymakers
by Michael Trucano
#24: originally published on Friday, 4 October 2013

Following up on previous blog posts exploring issues related to planning for new investments in digital teaching and learning materials to be used across education systems, I thought I’d share some of the general recommendations that have often featured in related discussions with policymakers in which I have been involved, in case they might be of utility or interest to anyone else.

This list certainly isn’t comprehensive. As with all posts on the EduTech blog, the standard disclaimers should apply (e.g. these are the views of the author and do not necessarily represent official views of the World Bank, etc.). It is perhaps worth noting that these sorts of suggestions are typically made and discussed within a specific context: A country has decided, for better or for worse, that it will consider significant new investments in digital teaching and learning materials. With this decision already made, policymakers are looking for some additional perspectives and inputs to help guide their thinking as they move forward.

In other words: These sorts of recommendations typically are not meant to inform higher level discussions about fundamental strategic priorities in the education sector (although, where they may help trigger reconsideration of some broader decisions made at higher levels, that may not always be such a bad thing). They are not meant to help, for example, policymakers assess whether or not to spend money on digital textbooks versus buying related hardware, let alone whether or not investments in digital learning resources should be made instead of spending money on things like school feeding programs, improvements in instruction at teacher training colleges, or hiring more teachers. Rather, they are more along the lines of:

So you have decided to buy a lot of ‘digital textbooks’?
Here is some potential food for thought.

With that context and those caveats in place, here are ten general
recommendations that education officials contemplating the use of digital teaching and learning materials at scale across a country’s education system may wish to consider during their related planning processes:

1. **Take a holistic approach**
Policymakers should not consider investments in digital education content separately from investments in traditional printed materials. Decisions related to both should be considered in an integrated fashion, and relevant links to related decisions about (e.g.) *infrastructure* and *assessment* should be explored as well. Planners would do well to include a variety of actors from outside the education sector in related consultations, policy formulation and decision-making processes. This could include groups which haven’t traditionally been consulted related to decisions related to textbook provision in the past, including the ministry of IT and telecom authority and representatives of the tech industry.

2. **Pursue complementarity before full substitution**
A ‘big bang’ approach to replacing printed textbooks with digital materials at large scale may be ill-advised. Traditional printed textbooks will continue to be useful tools, and be cost-effective, for many years to come. When investing in digital teaching and learning materials, first look to see how printed and digital materials may complement each other, and concentrate initial investments in digital content in ways that take advantage of affordances or functionalities not offered by traditional printed textbooks.

3. **Assume change (in technologies, in market participants, in content)**
The educational publishing industry is undergoing a period of rapid disruption. New players may emerge, and old players may disappear. Digital content produced using ‘old’ standards and technologies may become difficult to support as new technologies and technology standards emerge. Technological advances may disrupt existing cost structures and business models in fundamental ways. Planners should consider not only how new content will be acquired, but how to ensure seamless transitions during periods of expected change.

4. **Be sure to calculate and budget for total costs over time, and not just the upfront costs of content acquisition and the purchasing of devices**
Planners should avoid the temptation to focus only on upfront costs of the acquisition of content and the infrastructure necessary to support the distribution and use of this content. Especially where investments in learning materials includes investments in technology, TCO approaches to estimating costs are critical where the successful use of these materials will need to be supported over time.

5. **Avoid dependence on a single vendor – and try to ensure a diversity of suppliers and supporting ecosystem of actors and partners**
Lowest cost approaches to the acquisition of digital education content can prove to be very expensive over time if they result in too great a dependence on any one vendor. “Lock-in” – a situation from which it can be difficult to exit without costly time and expense – can develop on a number of different levels as technology use increases in an education system.
6. Consider that public relations and community outreach campaigns can be crucial to the adoption of new digital teaching and learning materials
Simply making available educational content in digital formats may not be sufficient to ensure that it is actually utilized. Providing information to, and enlisting the collaboration and support of, various stakeholder groups – e.g. parents, community leaders, teachers, school administrators, civil society groups and students themselves – can be vital to increase the likelihood that investments in digital teaching and learning materials are put to productive uses.

7. Don’t neglect training and ongoing support
Investments in digital teaching and learning materials may need to be complemented by investments in training (e.g. for teachers) if such content is to be used successfully across an education system.

8. Be aware that new competencies, and possibly even new institutions, may need to be developed to help direct and oversee related activities
Existing capacity within government may be insufficient to deal with new processes and complexities that typically accompany large scale investments in digital teaching and learning materials. New institutions – or new structures within existing institutions – may need to be created and supported to help guide, oversee and implement efforts to introduce digital educational content. New skill sets may be required of the people who work for such groups.

9. Review existing laws and regulations as they may relate to the use of digital teaching and learning materials
The use of educational content in digital formats brings with it a set of new challenges and opportunities related to the consideration of (e.g.) intellectual property rights. As relevant, be prepared to help lobby for changes that may be needed to help ensure educational goals and objectives are not compromised as a result of inadequate, outdated or poorly drafted laws and guidelines.

10. Assess existing procurement processes to ensure that they are appropriate and relevant – and make changes where necessary
Existing mechanisms and practices used to procure printed textbooks may not be appropriate, or cost-effective, when procuring learning materials in digital formats. A number of changes in the markets for such content, including the bundling of various goods and services by vendors, the emergence of ‘open educational resources’, and the need to link or embed digital content within content management or assessment systems, may pose challenges to existing procurement processes.

As always, please feel free to tell me where I’ve got it wrong, what I’ve missed, and/or how I could have stated things differently or better. If you found this blog post to be of interest, you might also want to check out related posts on digital teaching and learning materials that explore some related myths and misconceptions, textbook policies, costs and procurement issues.
Note: The image used at the top of this blog post of an architect planning his next moves ("ok, what should I be considering at this point ...?") comes from Wikimedia Commons and is in the public domain.
For the past seven years, the Korean Education & Research Information Service (KERIS) has hosted an annual global symposium on ICT use in education, bringing senior policymakers and practitioners from around the world to Seoul to share emerging lessons from attempts to introduce and utilize information and communications technologies to help meet a wide variety of goals in the education sector. Each year this event, which is one important component of a strong multi-year partnership between the World Bank education sector and the Korean Ministry of Education, focuses on one particular theme. This year's symposium examined the 'changing role of teachers' and featured presentations from, and discussions with, policymakers from 22 countries. This was also the dominant theme of the first global symposium back in 2007 -- but, oh my, how the nature and content of the discussions have changed!

At that first symposium, much of the talk from policymakers in middle and low income countries was still of promise and potential, of the need to begin preparing for what was inevitably going to come. Where there were specific lessons and models and research to share, these were largely those from places like the United States, the UK, Australia -- and of course from Korea itself! For most of the policymakers from middle and low income countries participating in the event, helping to prepare and support teachers as they sought to use ICTs in various ways in support of their teaching, and to support student learning, was something being explored in various 'pilot' activities, and a topic perhaps given some (at least rhetorical) attention in national education policy documents. It wasn't yet a real area of large and sustained activity and expenditure -- largely because there just weren't that many computers in most schools, and what computers that were present were mostly to be found in computer labs, presided over by 'computer teachers' of various sorts. As this year's event made clear, the introduction of PCs, laptops, tablets, and interactive whiteboards is something that is now happening *right now* in very large numbers in countries of all sorts, and ministries of education are ramping up and reforming their teacher training efforts as a result.

A few quick highlights from this year's symposium:
• A presentation from Turkey was received with great interest, given the huge magnitude of that country’s FATIH initiative, under which over 12 million tablets are being procured, over 100,000 interactive whiteboards are being installed in schools, and a tremendous amount of digital educational content is being made available.
• A representative from the MOE in Ghana presented plans to connect schools and roll out tens of thousands of educational laptops and digital content.
• A participant from INSPIRE in Italy presented results from a recent OECD review of the Italian 'strategy for digital schools', which highlights challenges related to teacher training and support.
• A representative from the MOE in Malaysia shared lessons from efforts there to offer as the online ICT competency test in that country (in 2013, 420,000 students and 10,000 teachers will take this test online).
• A representative from the MOE in Viet Nam presented on that country's new 'National Strategic Plan on ICT Application & Teachers Professional Development'.
• A representative from Thailand presented on that country's large educational tablet project and the implications for teacher training.

With so much happening, so quickly, and at such great expense (!), there was common agreement about the need for not only detailed impact evaluations (although of course there was pretty unanimous agreement about the importance of such work) but also for the dissemination of findings from quicker, 'lighter' (and cheaper) types of evaluation work, given that ministries of education are moving forward very quickly, and not ready to wait for unequivocal results from multi-year randomized control trials of the use of yesterday's technologies as they attempt to make decisions about how to plan for the use of the technologies of tomorrow.

We need ways to stay on top of emerging trends and lessons, especially as they emerge from other middle and low income countries, and help in communicating findings from on-going efforts and research in ways that policymakers can quickly digest and use as inputs into our decision making. We need to know what makes a difference (and what does not), but also very practical 'how-to' advice while we attempt to identify and explore these differences, I was told.

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To help kick off the discussions, I attempted to provide a quick snapshot [here's the presentation] of what the research literature and emerging 'good practice' tells us about a number of key topics related to the use of informational and communication technologies (ICTs) by teachers, and about ICT use in teaching, of potential relevance to policymakers and planners, especially in educational contexts in middle and low income countries. As part of a quick summary of a very large body of knowledge based on practical experiences around the world, I looked at what we know, what we don't, and what we believe (although there may not be evidence in support of this belief) related to things like pedagogical practices; teacher knowledge, skills and attitudes related to ICT use; professional
development and support; and incentives/disincentives enabling/inhibiting effective use of technology. In the course of doing so, I made five general assertions:

1. **Teachers remain central to the learning process in the digital age**
   Despite fears often expressed by some groups (e.g. teachers unions) about technology being used to replace teachers, and the interest in some quarters to use technology to this end, there is no evidence that such a phenomenon is occurring. To the contrary: The role of the teacher in countries where technology is in widespread use is typically seen as more important, not less, than it was previously.

2. **The promise and potential of ICT use by teachers is recognized but largely unmet**
   The potential for ICT use to support and enhance the work of teachers – to engage with learners in new ways (including those with special educational needs), to broaden access to high quality learning materials, to lessen various administrative burdens, and to offer more effective tools to aid in formative and summative assessment – is widely acknowledged. In reality, however, technology is, for the most part, having little substantive impact on observable teaching practices in the classroom.

3. **Innovative pedagogical practices are increasingly linked to the effective use of ICTs**
   Many countries have identified the need to help learners develop sets of "21st century skills" if they are to effectively compete and prosper in increasingly globalized economies and become healthy, happy and productive citizens in their increasingly interconnected societies and communities. In order to meet new demands placed on them, education systems are being challenged to innovate, both at the system level, and at the level of instruction. In classrooms, innovative pedagogical practices are often closely linked to, and enabled by, the use of ICTs.

4. **Incentives and support mechanisms need to be put in place to motivate and support teachers in their use of new technologies**
   Providing technology infrastructure in schools, and placing this infrastructure in the hands and on the desks of teachers, is only one step in a process. For teachers to actual use this equipment in support of their teaching objectives and practices, a variety of intrinsic and extrinsic incentives need to be employed, at various levels.

5. **Teacher training is a critical component if investments in ICTs are to be maximized**
   Teacher training and continued, on-going, relevant professional development for teachers are essential if benefits from investments in ICTs are to be maximized. In the absence of sustained and various opportunities for teachers further enhance and improve their skills and knowledgebase, the use of technology can still (potentially) make good teachers better, but (often) can actually make poor teachers worse.
From this very general start, things quickly got very specific. Jonghwi Park from UNESCO reviewed findings from an upcoming paper reviewing national ICT competency standards for teachers across Asia. Javier Luque from the Inter-American Development Bank previewed findings from an upcoming research paper exploring how the deployment of ICTs is affecting teaching practices in Honduras. The presentations are all available on the related event web page.

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During one of the discussion sessions, I shared two anecdotes that seemed to resonate with many policymakers because they highlighted practical opportunities and challenges related to teacher professional development as they might relate to training in new technologies. Given the response I got in person (and subsequently by email), I thought I'd quickly share them here, in case they might be of any wider interest:

The first related to potential linkages between planned raises in teacher salaries, the introduction of new competency requirements for teachers, and ICT roll-outs. In many countries, there can be opposition of various sorts from teachers (and teachers unions) to plans to spend lots of money putting computers in schools. One commonly voiced argument in this regard (there are many) is: Why not just simply give us (i.e. the teachers) this money instead of buying all of this new equipment? We are underpaid as it is and could do with a raise, and now you expect us to deal with the inevitable disruptions that will result (at least in the short term) from introducing all of these new devices? These are quite legitimate questions, of course!

A somewhat related joke which I've heard from a few people (but perhaps told most engagingly by Brian Gonzalez of Intel, so I'll credit him here):
- When teachers hear that computers (laptops, tablets) are coming to their school, they are excited.
- When teachers hear that computers are coming to their classrooms, they are delighted.
- When teachers hear that computers are coming for every student in their classroom, they are terrified.

The point is that the mass introduction of devices directly into the hands of students can be very disruptive -- and teachers will need to be supported as they manage their way through (and, hopefully, take advantage of) this disruption.

One often sees the mass introduction of ICTs into an education system as an important component of a larger educational reform process. About a decade ago in
Jordan, there was a big push to further 'professionalize' teachers and give them a large raise. In order to qualify for the raise, though, teachers needed to successfully complete some new training activities so that they could be promoted to a higher level. At the same time, a large number of computers were being introduced into the countries schools for the first time under the Jordan Education Initiative, and teachers were able to use their successful passing of new ICT-related competency exams as a way to qualify for promotion -- and thus get their raise. So, one lesson for other countries might be: If you are planning on increasing teacher salaries across the board by a large amount (i.e. not just a small cost of living adjustment), and if you are embarking on a plan to help support teachers by enabling them to develop additional sets of skills and competencies, and if you are at the same time looking to introduce ICTs into your education system at a mass scale ... might there be a way to link all three of these interests in ways that are useful and strategic?

The second anecdote (from a country which I'll not name, but which I expect some long time readers of the EduTech blog will be able to identify) concerned the introduction of new teacher training and competency requirements related to ICT use in one particular province. As it was explained to me at the time, teachers under the age of 32 were required to take 100 hours of ICT-related professional development in order to keep their jobs. For teachers aged 32-45, a similar 40 hour training course was recommended. Teachers over age 45? Not required, not recommended -- and not even offered. Why should we invest in the teachers who will be the first to retire and how are the most resistant to change and technology use? I was asked (rhetorically, I assumed). It's better to concentrate our investment on younger teachers, who are already more comfortable with using the technology to teach and who will be teaching with it for decades to come, especially given that our resources for training are scarce. I was, to be honest, rather shocked by this at the time (still am, in fact). When I asked if I could get a copy of the policy outlining this practice, I was told that there was no such official policy written down, but that, given the fact that they had to roll out the new teacher training activities over a period of many years, and that an inevitably a new reform would be introduced at some point anyway, this sort of thing could be arranged at the implementation level.

I told this anecdote at the global symposium as a way to illustrate how one country was choosing to address issues of teacher age, perceptions about attitudes toward technology, and scarce resources, assuming it was an extreme outlier. Upon hearing the anecdote, policymakers from two different continents confided that something similar happens in their countries as well. The point here, I guess, is that policymakers have to make tough decisions about use of scarce resources -- including related to teachers, training, and the use of ICTs -- and there are, it appears, some rather inventive ways that such decisions are playing out in different parts of the world.

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However one feels about the mass introduction of new technologies into education systems around the world, the trend is clear. Just as the lives of teachers and students outside of schools will (for better and for worse) be increasingly enabled, mediated, and distracted as a result of technology use, so too will teaching and
learning practices within classrooms change. Change inside schools will no doubt happen at a much slower pace -- but it will happen. For it to happen in ways that are useful / impactful / productive / efficient (feel free to substitute in your adjective of choice), education policymakers will need to invest resources in ways that support teachers as they utilize ICTs. This year's global symposium on ICT use in education in Seoul provided yet more evidence in support of this belief.

*Note:* The image of traditional Korean dancers used at the top of this blog post ("it's part art, part craft ... and there's some science in there too") comes from Seong J Yang via Flickr and is used according to the terms of its Creative Commons Attribution-ShareAlike 2.0 Generic license (CC BY-SA 2.0). It was located with the help of the Creative Commons search tool.
Who owns the laptops and tablets used by students and teachers, and how does this affect their use?

by Michael Trucano

#26: originally published on Monday, 25 November 2013

Many countries and education systems around the world are currently engaged in large-scale efforts to introduce huge numbers of computing devices (PCs, laptops, tablets) into schools and into the hands of teachers and students, and many more initiatives are under serious consideration. However one might feel about such projects (in general, or in particular instances), there is no denying that these can be quite complex undertakings, rolling out over many years, in multiple stages, with many interdependent components (related to e.g. infrastructure, content, training, assessment), and costing (tens of, sometimes hundreds of) millions of dollars. When planning such initiatives, there are many questions to be asked, large and small. One question that I don’t find is typically given much serious attention relates to what would, at first glance, probably appear to be a rather simple one, with a simple answer:

*Who owns the laptops (tablets) that will be distributed to students (teachers)?*

I regularly ask this question as part of my interactions with leaders of various such projects around the world. I find that I rarely get a simple or complete answer. This is potentially problematic, as the responses to this question, and a set of related ones, can have a very profound impact on how such projects function in practice, and thus on their (potential) impact as well.

Here’s one example of why this sort of thing is important:

In one country’s teacher laptop distribution program that I evaluated a number of years ago, the decision was made by the ministry of education to assign ownership of the laptops to each individual school, with the headmaster of each school responsible for setting the rules and policies related to the ownership and use of the laptops. As a result of not having unscheduled time during the school day, it was assumed, if not expected, that teachers would take the laptops home for use in things like lesson planning. A lot of money was spent on teacher training with this goal in mind. During the first week of the deployment in one of the first schools to receive laptops, a teacher brought her laptop home – and it was promptly stolen. When she reported this theft to her school principal, she was told that she was liable for the full cost of her laptop – a sum equivalent to a few
months’ salary -- to be paid immediately! One result: Other teachers in the school decided not to take their laptops home – and, given that they were now all online and had official email accounts that they were encouraged to use, quickly spread news about what had happened at their school, leading large numbers of teachers in other schools who had been assigned laptops to decide not to take them home either. This was a rational choice, some might argue, given the precedent for potential immediate financial hardship that had been set, the lack of an official related policy communicated to teachers, and the fact that most of them had been teaching for many years without laptops (and so had few qualms about not using one in the new school year). Government officials were left wondering why so few teachers were using their new laptops to visit any of the official lesson planning resources that had been developed (at not insignificant cost) and uploaded for their benefit to the national educational portal.

I have shared that anecdote (and a few similar ones) with educational policymakers planning large scale roll-outs of so-called “1-to-1 education computing” initiatives (each person her own device) for quite a few years now. Once I have caught their interest, I typically pose a set of five related questions to them about what they are planning:

1. Who owns the device?
2. How can it be used?
3. If it ‘breaks’, or is ‘used improperly’, who is ‘responsible’ and what are the consequences?
4. Who decides the answers to these questions?
5. How (or to what extent) is this information communicated to key stakeholder groups – school administrators, teachers, students, and parents?

In an unfortunate number of instances, I find that these issues have not been considered in any systematic or strategic way. When I pose these questions after the fact to people who have led such efforts, I often find that they say that things like, we wish we’d paid more attention to these issues on the front end, as it really impacts usage, and that their answers to these questions had changed over time, based on what they had learned (sometimes painfully) during the course of their country’s related programs. There are no universally ‘right’ answers to these questions – but plenty of wrong ones.

When asking and answering such questions, there a number of things that may be worth considering. Here are a few of them:

**Ownership can determine usage**

As the anecdote above demonstrates, both policies about device usage, and the actual usage of the devices in practice, can follow pretty directly as consequences of decisions made about device ownership. For this reason, it is important to how the ownership model(s) in place related to education devices might impact how the devices will (or won’t) be used.
Ownership models
There are four primary educational device ownership models prominently found in education systems around the world.

1. **Government buys, government owns**
   This model is pretty easy to understand. A government buys devices for use in government schools. Just like it does when purchasing desks or chalkboards or soccer balls, these remain the property of government. Under such schemes, one part of the system may buy the devices and transfer the ownership of the devices to another part. For example, a central ministry of education procurement office buys the devices and ownership is assigned to a regional educational authority (like a district education office) or to an individual school.

   One thing that some countries are finding is that their existing inventory rules and procedures related to government-owned equipment can be challenged by large-scale purchases of ICT devices. For example, laptops could be sourced and delivered regionally. However, for the devices to be officially entered onto the government’s books, they need to be physically processed through one physical central facility. In one case that I know about, a central government institution approached the ministry of education *after* tens of thousands of devices had been delivered to schools and said essentially, *You know, all of these devices need to be sent to our warehouse to be processed as per government regulations. Once we are done with them, you are free to return them to the schools.* The ministry responded by noting that there was no need to do this physically, as they could track all of these devices remotely over the Internet. *That is great that you can do that, came the response, but rules are rules, we need to physically check that these devices indeed exist, so please send them all to us.* (Needless to say, this was a bit of a problem.)

2. **Government buys, user (teacher, student) owns**
   This model is also conceptually (if not always legally or administratively) straightforward: Government buys the devices and simply gives them to (e.g.) students. Where this occurs, it is important that there be some coordinated mechanism by which these devices can be repaired and replaced, as might be necessary (and required under the terms of warranties or other arrangements).

3. **User buys, user owns**
   In a number of places, governments have decided that ICT use in education is important, but that government itself should not be procuring PCs, laptops or tablets. In a number of wealthy countries, for example, education systems have been exploring how students and teachers, most of whom have their own devices already, can simply use their personal laptops and tablets, freeing government to invest money in other ways. (This is referred to as ‘bring your own technology/device’ or BYOT/BYOD.) In both rich and poor countries, various schemes to promote device ownership in the education sector have been introduced (sometimes these are means-tested, e.g. to qualify a family needs to be below a certain income level; sometimes they are merit-based, e.g. students who get high
marks qualify). One common way to promote device ownership is to establish a special financing facility whereby (for example) teachers get low or no interest loans to enable them to buy laptops. Linking loans, and the repayment of these loans, to the existing payroll system is one way to reduce some of the administrative burden for individual teachers. Under this model, it can be quite important for there to be a common understanding about how such devices can be used on school premises, as well as when used at home to access official government educational resources. Some countries where the personal ownership of computing devices in society is quite low may say that issues related to BYOT/BYOD are not (yet) relevant to them, and will not be relevant for many years to come. This may well be the case ... although in such circumstances it is worth considering that fact that increasing number of teachers and students may be bringing mobile phones to school ....

4. Leasing
When talking with countries that have already decided to buy huge numbers of computing devices for use in their schools, one of the first questions I ask them is: Why do you want to buy them? Have you considered leasing them instead? There are a number of reasons why leasing might be a good option for education systems. It can provide greater incentive for vendors to honor their maintenance contracts (given that, at the end of the lease, the equipment will be returned to them). Where multi-year device roll-outs are envisioned, leasing can result in education systems getting automatic upgrades on the specifications for the devices in later years, as it can be easier for vendors simply to supply devices that are currently available in the market, which often exceed the specs defined in the original tender documents. It is of course important to note that, in most middle and low income countries, markets for the leasing of ICT equipment are often quite underdeveloped (and in fact may not exist at all for a variety of historical, business, legal and regulatory reasons). In such cases, where an education system is considering what may well be the single biggest procurement of ICT equipment in a country’s history, it may be worth considering: Might there be an opportunity to create such a market?

Maintenance
As expensive as it may be to buy a lot of devices for use in schools, the costs of supporting these devices -- and keeping them working! -- can be quite considerable as well. (To increase the chances that such investments will ‘pay off’, however that may be defined, investments in lots of other things like teacher training and quality digital learning resources, may well need to occur too!) Maintenance contracts and service level agreements are therefore of critical importance. In such matters (as with leasing arrangements), it is typically the case that vendors have much more related knowledge, experience and expertise than education officials. This information asymmetry is especially pronounced where education systems are doing this sort of thing for the first time; while vendors tend to be very well informed about these sorts of issues in other sectors, and in other countries, a ministry of education may be a relative newcomer to them.
Acceptable Use Policies
One *very* useful tool for education systems or schools that are rolling out new educational technology initiatives is to have a document that clearly articulates the expectations around the use of ICT devices (as well as the content on the devices, and the content and information services that the devices can access). In many education systems, such acceptable use policies (AUPs) are included in a document that is signed by students (and their parents) or (in the case of teacher devices) teachers outlining what can be done with the devices, the responsibilities of various parties involved (e.g. the government, the school, the teacher, the student, the student’s family, vendors) and the consequences if these policies are not followed. Those who have never drafted acceptable use policies of this sort are in luck: There are literally hundreds of examples of AUPs that can be found with a quick Internet search. Developing such policies is increasingly made more complicated by the use of non-school devices for educational purposes (e.g. a student uses a family computer at home to access a national education portal, a teacher contacts a student outside of school via email or social media, someone brings a personal device onto a school network, etc.).

Making decisions about device ownership and usage
One lesson that many education systems have learned the hard way is that, when decisions are being made about the ownership and use of ICT devices, it is best not to leave such decisions solely to the ICT folks. The technical people should be part of the decision making process, of course, as there are important technical issues that need to be considered. If, however, you want to ensure that the equipment is used in ways that support teaching and learning (which is presumably the whole point), you need to have the pedagogical folks (supported by people represented important administrative perspectives and realities) involved in prominent ways in the decision making process as well.

Communication
It is one thing to make well-considered decisions about issues related to the ownership and use of ICT equipment in schools -- and by teachers and students outside of school. No matter how good such decisions may be, and how good the related policies may be, if these decisions and policies are not communicated to the various stakeholders involved, serious misunderstandings can result that can impact how the devices are used. It’s not only about who owns what, but also about who thinks they own what (and what rights and responsibilities may follow as a result). Parents may be confused by the fact that they are responsible for paying for their children’s textbooks (or school uniforms, or other basic school supplies), but at the same time their children get a free tablet computing device. Schools may be surprised to learn that they own the desks that the government buys for them, but not the laptops. Vendors may be ‘on the hook’ if equipment breaks and so may tell schools things that are contrary to policies that have been agreed upon at higher levels. In such environments, confusion about who makes decisions about whether or not students can take ‘their’ laptops home or not, about what they can (and cannot do) with ‘their’ tablets (can they surf the Internet?), is not only understandable, but in many cases to be expected. Establishing, supporting and maintaining various channels of related communication can therefore be important.
In addition to sending various types of official communication through formal channels within the education system, AUPs can help with some of this; so can the mass media.

It is said that a tool is only as good as the person using it. This is undoubtedly true. It is also true that a tool’s usefulness is a function of how people are permitted and able to use it. However an education system rolling out large numbers of PCs, laptops or tablets across its schools may decide to answer basic questions about the ownership of these devices, it is important to note that these decisions can have a profound impact on how such equipment is actually used. Given the large amounts of money that are being devoted to 1-to-1 educational computing activities around the world, and the great potential that the use of such devices can have in improving teaching and learning practices and opportunities, it can be a real shame when such decisions are entered into lightly, or made incompletely – or left to people whose interests are not well aligned with those of teachers and students.

You may also be interested in the following EduTech blog posts:

- Textbooks of the future: Will you be buying a product ... or a service?
- Big educational laptop and tablet projects -- Ten countries to learn from
- The Maine thing about 1-to-1 computing
- Next steps for Uruguay’s Plan Ceibal

Note: The image of smiling girl used at the top of this blog post (“yes, that’s right, that new tablet is mine, all mine!”) comes from the Wikipedian Wilfredor (via Wikimedia Commons), who has put it in the public domain.
More about MOOCs and developing countries
by Michael Trucano
#27: originally published on Wednesday, 12 December 2013

The New York Times famously labeled 2012 the 'year of the MOOC', acknowledging the attention and excitement generated by a few high profile 'massive open online courses' which enrolled tens of thousands of students from all of the world to participate in offerings from a few elite universities in the United States.

What might 2014 bring for MOOCs, especially as might relate to situations and circumstances in so-called 'developing countries'?

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It may be hard for some in North America to believe, given the near saturation coverage in some English language web sites that focus on higher education and in certain thematically-linked corners of the English-language blogosphere, but the 'MOOC' phenomenon is only just now starting to register with many educational policymakers in middle and low income countries around the world. While many MOOCs have (from the start, and increasingly) attracted students from all over the world, at the policy level, 'MOOCs' have not – at least in my experience during the course of my work at the World Bank on education and technology issues -- been a topic much discussed by our counterparts in ministries of higher education and universities. Yes, one does see the occasional bullet point in a PowerPoint presentation towards the end of an institutional planning meeting, but my impression is that this can often be as much a reflection of the speaker’s desire to project a familiarity with emerging buzzwords as it is a reflection of any sustained strategic or practical consideration of the potential relevance (or threat) of MOOCs to traditional practices in higher education outside of ‘rich’ countries.

More than a few commenters in North America have invoked the Technology Hype Cycle (a concept developed and popularized by Gartner to represent the maturity, adoption and social application of certain technologies, and their application) when proclaiming that MOOCs have now past a ‘peak of inflated expectations’ to enter a period known as the ‘trough of disillusionment’ as a result of things like the recent change of course or ‘pivot’ of Udacity, one of the leading MOOC platform providers.
While this assessment of the state of maturity/adoption may or may not be true from a North American perspective, and even if we concede that technology hype cycles are being compressed (it took Second Life and other ‘virtual worlds’, another recent notable educational technology phenomenon, three times as long to move from a period of great hype in educational circles to one of ‘disillusion’), such commenters may often neglect to consider that many hype cycles can exist simultaneously for the same technology or technology-enabled approach or service, depending on where you might find yourself in the world.

While perhaps unsure of the extent to which MOOCs represent a 'threat' to existing educational practices, a new avenue for higher education, or perhaps something else entirely, I agree with people who say that the reports of the death of the MOOC are highly exaggerated. Roy Amara, the longtime president of the Institute for the Future, famously remarked that "We tend to overestimate the effect of a technology in the short run and underestimate the effect in the long run." I would not be surprised if this holds for many of the trends that we, as a matter of convenience, and correctly or not, group together under the general heading of ‘MOOCs’ today.

In my personal experience working at the World Bank on projects at the intersection of technology and education sectors, and when in discussions in many similar sorts of international organizations, ‘MOOCs’ are, generally speaking, still not a hot topic of consideration for educational policymakers in most middle and low income countries. That said, they are starting to gain increasing mindshare in some places. At the very least, they are generating some real confusion (and where there is confusion, there is potentially opportunity as well, for better and for worse).

As a result, many folks in the international donor community are now beginning to ask themselves questions like:

- How can, or should, we be talking about MOOCs when speaking with our counterparts in government around the world?
- What are the real, practical opportunities to consider in the short and medium term?
- Where, and how, might education ministries and universities wish to engage with related issues -- and what role (if any) should organizations like the World Bank play in this process of engagement?
For what it’s worth, and as a follow-up to a short series of MOOC-related posts on the EduTech blog earlier this year, I thought I’d share some of the things I am hearing in the course of my work at the World Bank related to this topic, in case doing so might in some small way enrich the global discussion around related emerging issues. What follows is based on my involvement in internal discussions (probably not really of much interest, but in case transparency in this area is useful, I draw on them here) as well as discussions with other international donor agencies, companies, educational institutions in developing countries, researchers, and with government officials. (Two groups notably absent from this list, at least in my estimation, are teachers and learners – for insights in those regards I have largely been relying on reporting by other groups.) As with all posts on the EduTech blog, the comments and observations here are my own – I don’t speak for my colleagues or for World Bank.

A quick caveat/disclaimer related to Coursera: The IFC, the private sector arm of the World Bank Group, made a small equity investment in Coursera, one of the leading MOOC providers, earlier this year, one of its many investments in companies active in the education sector. I don’t know the details about this investment beyond what is publicly available. I talk occasionally to the folks at the IFC about their investments in the education sector, and have spoken to people at Coursera as well to learn more about what they are doing (as I do with other leading groups active in this area), but have not had any access to privileged information beyond what I have linked to here. Separate from this, there is a small pilot activity within a much larger World Bank education project in Africa in which Coursera is involved, and Coursera is one of the partners meant to be involved in the World Bank’s Open Learning Campus for ‘development partners and practitioners’ once it launches in 2014.

With that said, here are:

**10 observations and comments about MOOCs and ‘developing’ countries**

1. **MOOCs and mindshare**
   While still a fringe or frontier issue in most educational policy circles in developing countries, preliminary discussions about the potential relevance of MOOCs are beginning in many places. Part of this is a result of the continued heavy press attention that this topic receives in media outlets in North America (here’s a quite useful summary of this, from a government department in the UK). Part of this is a recognition, one supposes, that some of the best students (and faculty!) in some of the leading universities in a country have begun to explore MOOCs as learners. Some of these universities are also being approached as potential partners to extend the reach and offerings of existing MOOC providers. Articles with a focus on developing country contexts are slowly beginning to appear in the popular press, although this is admittedly mostly still occurring in press outlets in countries that are ‘exporting’ MOOCs. (Here at the World Bank we monitor press reports related to
education issues in the counties where we work – which is most countries – and we don’t yet see many articles about MOOCs that are more than summaries of related stories that appear in Western news outlets.) **Announcements** such as those of the full computer science master’s degree program offered by Georgia Tech via MOOCs at a reduced cost have spread quickly within computer science faculties in developing countries, and academic leaders have **begun to consider** what these developments might portend for their universities.

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2. MOOCs providers outside the United States

Until recently, the fact that the three largest and most prominent MOOC platform providers (Coursera, EdX, Udacity) are based in the United States has meant that MOOCs have been largely considered by many to be an American* phenomenon. This is starting to change as MOOC providers and initiatives of various flavors emerge out of countries like the UK (FutureLearn https://www.futurelearn.com/), Germany (iVersity), Spain (UniMOOC) and Australia (Open2Study), as well as from developing countries such as Brazil (Veduca) and China (XuetangX and Ewant). **Kepler from GenerationRwanda** is a Rwanda-based MOOC. Ireland-based ALISON is actually considered by some to be the first MOOC provider (predating the ‘big three’ American initiatives).

The large American MOOC platform providers currently reach **students all around the world** and are exploring potential link-ups with some of the leading higher education institutions in countries such as China, Brazil and Turkey. Initiatives such as Coursera’s **Learning Hubs**, physical spaces supported by partners where MOOC participants can gather, suggest a potential model to extend the reach of MOOCs to groups of learners in developing countries who may not be already accessing, or completing, MOOCs.

With the emergence of what essentially are ‘national champion MOOCs’ in many OECD countries, I would not be too surprised to see a few international donor agencies support the expansion of such efforts as part of their developmental assistance program.

*Apologies to my hemispheric neighbors for using the term 'America' here to refer only to the United States, a formulation against which I know many other inhabitants of the Americas chafe. Special apologies in this regard to one group of North Americans: those in Canada, where many of the leading theorists and early pioneering practitioners in the MOOC field continue to be found.

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3. Research about MOOCs

Precious few of the policy decisions made to date related to MOOCs have been evidence-based. This isn’t meant as a criticism, necessarily, but rather to reflect the

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reality that large scale MOOCs have not been around for a terribly long time, and so there is a very shallow research base to inform related policymaking, no matter the country. This is starting to change.

Two aspects of MOOCs make them particularly interesting for researchers: the fact that some of them have so many students (thousands, and in some cases tens of thousands), and the fact that, because every aspect of participation in a MOOC (each click, each pause of a video, each forum post, each log-in, each test answer) generates data -- indeed, *lots* of data! A recent paper from researchers at the University of Pennsylvania, one of the first institutions to offer MOOCs, looks at Who Takes Massive Open Online Courses and Why? Expect to see many more such research papers emerge in the coming months, especially as a result of the Gates Foundation-funded MOOC Research Initiative, which last week brought researchers to the University of Texas at Arlington to report on their progress with 30 research projects. While most of the MRI-funded research has a decidedly ‘developed country’ flavor, much should have broader relevance as well. Preliminary results and lessons from the Georgia Tech computer science degree MOOC, which in part explicitly targets students in Africa, as well as from the World Bank pilot in Tanzania, should also begin to emerge by the middle of next year.

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4. MOOCS vs. online learning vs. distance education

When asked to participate in strategic discussions about MOOCs, I often quickly find myself asking: What are we really talking about here? I am not talking about the differences between so-called ‘cMOOCs’ and ‘xMOOCs’ (for better or worse, a distinction that has greater currency among certain sets of academics than it does for most education policymakers). I am talking about misunderstandings that are more fundamental.

Many times when I am asked to advise groups considering MOOCs, I find that they conflate and confuse a number of different things, and what these groups really want to talk about is some form of distance education or online learning offering. As a practical matter, it usually isn’t too difficult to identify a policymaker’s real information needs in this regard, once a few core definitions are made and common agreement is found for the use of a few common labels. While many initial inquiries from policymakers in developing countries (and their interlocutors in donor agencies) that arrive in my in-box may at first glance appear to be about ‘MOOCs’, I more often than not find that lots of experiences, models and lessons in online learning and distance education from places like the University of South Africa (UNISA), Indira Gandhi National Open University (India) and Malaysia’s Wawasan University (to cite just three of many prominent institutions with a long track record of providing distance learning to students in developing countries) are really the relevant ones to pass along, together with references to 30+ years of longstanding practices of potential relevance. The World Bank’s specific experience supporting the African Virtual University is often seen to be of value as well.
5. Criticisms of MOOCs in developing countries

Type in ‘MOOC’ to your favorite search engine and you will quickly see that there is no shortage of opinions on the ‘MOOC phenomenon’, positive and negative. One legitimate response to criticisms of MOOCs is that this stuff is all quite new, and so certain criticisms may be premature, as everything is changing so quickly. Even if you sympathize with such a line of thought, just because MOOCs are in their infancy doesn’t mean that *all* criticism is unwarranted. There is some rather predictable crankiness from certain segments of the established professoriate and commentariat which, even if it is at times a bit unfair, perhaps serves as a useful antidote to the rather breathless enthusiasm of some evangelical technologists who have, on a basis of a few quite fascinating and quite innovative initial activities, proclaimed that a revolution in higher education is at hand. (There are of course lots of views in between, and even a few outside, these two extremes.)

In a previous blog post from a few months ago, I tried to quickly summarize some of these criticisms:

Some critics may lament that MOOCs represent a return to the ‘sage on the stage’ mentality that ICT-enabled learning practices were meant to make obsolete.

Other critics may see in MOOCs yet another wave in cultural imperialism from the ‘North’ and the ‘West’ crashing across borders, washing over (or possibly washing out) local educational institutions, cultural norms and educational traditions.

Still other critics fear the institution of a markedly two-tier system of global higher education, with a small number of elites able to participate in education the ‘old-fashioned way’ in small, intimate, face-to-face groups in close physical contact with their professors, while the vast majority of students, especially those in developing countries, have to make do with participating in a watered down, inferior educational experience delivered through MOOCs.

For what it’s worth, here are some of the most common criticisms of ‘MOOCs and developing countries’ that I am hearing these days from counterparts who work with technology in education in developing countries:

**Readiness for MOOCs.** In many developing countries, there is simply inadequate technology infrastructure to support the systematic use of MOOCs in any substantial way. This is true. This criticism is quite easy to understand – and agree with. That said, it is also true that we have seen explosive growth in the availability and affordability of ICTs over the past dozen years or so in many developing countries. Things can thus change quickly in this regard – not quickly enough, perhaps, especially for large segments of a country’s population (see also next item below), but, from an historical perspective, pretty quickly indeed. Even where the technology infrastructure is in place and affordable, to date most of the courses
have been offered in English. While this is changing, it still represents a rather significant barrier to participation in MOOCs by the majority of learners.

**MOOCs and equity concerns.** Another of the most obvious -- and legitimate, in my opinion -- criticisms of MOOCs relates to equity. As a recent paper from University of Pennsylvania researchers finds, most people who successfully complete MOOCs already have a university degree. SciDev.Net has summarized these findings as “Massive open online courses appear to reinforce the advantages of the elite”. In other words, despite much rhetoric (and a number of inspirational anecdotes about poor people in poor places benefiting from participation in MOOCs), a Matthew Effect seems to be in evidence here. In many ways, this shouldn’t be all that surprising. The first mobile phones I ever saw were toted around by rich people on golf courses in North America. Now, 30 years later, mobile phones are celebrated as one of the truly democratic technologies around, with the devices increasingly in evidence in some of the poorest communities in the world. Just because a technology benefits a privileged group today doesn’t necessarily mean that this will always be the case. *But it doesn’t mean that it won’t be the case either*. Those touting MOOCs as a way to provide access to education for some of the poorest and most disadvantaged groups in developing countries don’t yet have much evidence to back up such claims.

**MOOCs and ‘cultural imperialism’.** Criticisms of educational ‘exports’ from countries in the more ‘developed’ Global North and West to ‘less developed’ counties of the Global South often are met in some quarters with charges that they are a form of cultural imperialism. Criticisms of this sort are often understandable, and predictable. As someone who both carries an American passport and works at the World Bank, I suspect comments from me on this issue may carry a sizable discount factor for many, so I’ll try to refrain from much editorial comment here. One response to such criticism that I hear is that many of the most popular MOOC courses are quite technical (e.g. courses in gamification and big data), and there is, I am told, often less cultural ‘baggage’ attached to MOOCs in these areas than there are to, say, course in the applied social sciences and arts. As transnational MOOCs emerge from the ‘South’ and ‘East’ as well, I suspect that some criticisms in this regard may become more complicated and nuanced.

**MOOCs and the building of ‘local capacity’.** When I speak with education policymakers in developing countries about MOOCs, I often find that many of them have never heard of the word or concept. Those that do know about them, though, quite often recite back to me some version of the prediction/boast of Udacity founder Sebastian Thrun that, as a result of MOOCs, "by 2060 there will only be 10 universities in the world". In my experience, this quotation is not repeated very warmly or fondly by such folks. Indeed, it is understandably considered a threat (and a rather hubristic one at that) and often serves as a barrier of sorts to exploring informed discussions about the potential relevance (or lack of relevance) of MOOCs to specific educational contexts. *If we partner with [insert name of MOOC platform provider here], how will we ever develop the capacity to do this sort of thing ourselves? Even where we acknowledge that many of our university lecturers may not be of the highest caliber today, are we meant to throw in the towel and
essentially outsource the teaching of courses to more highly qualified teachers in other countries? How will this help us improve the quality of our own faculty members going forward? If we are merely adopting technologies developed and maintained by others, how will we develop the capacity to develop such technologies ourselves? If one of the core competencies of universities in the future relates to their ability to offer courses online, how are we to develop as an institution if we effectively outsource this competency to another group? These are all legitimate questions to ask. I won’t attempt to discuss potential answers to them here, but I will note that there are basically two ways for policymakers to view opportunities to utilize MOOCs: They can essentially (and passively) participate in the ‘MOOC phenomenon’ as a consumer of things produced elsewhere, or they can use participation in MOOCs as a strategic opportunity to help develop related local capacities. Both options are legitimate, but the latter option, while much more difficult to pursue, may be worth serious consideration.

**MOOCs as vanity projects.** A number of countries have decided, as a developmental priority, to support the creation of a small number of ‘world class universities.’ My former World Bank colleague Jamil Salmi has highlighted the danger when governments and universities concentrate too much of their efforts to this end, neglecting other important constituent components of a healthy tertiary education system. One worst-case result can be the creation and cultivation of what are essentially ‘vanity projects’. In some circumstances, the decision to create a MOOC instead of investing scarce resources in other areas may yield a similar sort of result.

These are just a few of the common criticisms I hear of MOOCs and developing countries; there are of course many more, potentially. For what it’s worth, one criticism that I hear rather loudly among critics in developed countries about MOOCs relates to commenters’ lack of comfort with, if not outright opposition to, the role of ‘private capital’ in education. I note this here not to rehash or examine related criticisms – you can find plenty such discussions on the Internet without too much difficulty – but only to say that, in my experience, this reflects a certain strain of discourse that predominates mostly in ‘developed’ countries. At least so far: Perhaps, as certain MOOC providers become a more established part of the landscape in various places, such criticisms may emerge with greater volume from commenters in developing countries as well.

It is also perhaps worth noting (and this is perhaps stating the obvious) that one typically encounters multiple perspectives on MOOCs within a single higher education system. Some universities may see them as ‘competition’, for example, while some ministries of higher education may see them as an opportunity (or vice versa).

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**6. Getting started with MOOCs**
A quite common question that I hear from education officials in developing
countries is: *What level of ICT infrastructure is necessary to participate in MOOCs?* Or, as it was once rather memorably phrased to me: *What is the ‘minimally viable reality’ [interesting phrase!] we need to make this sort of thing happen?*

On the learner side, this is usually a pretty easy question to answer: You need regular access to a computer with reliable and affordable broadband Internet connectivity. (You also, it should be noted, usually need a good command of English, the dominant language of MOOCs to date, and you *always* need a lot of discipline.)

At the level of an institution, answers to this simple question become much more complicated. Where an institution is looking to support students participating in a MOOC offered by an existing MOOC provider, dedicated facilities and pedagogical support mechanisms (of the sort being explored under the Coursera Learning Hubs initiative) may be required. If an institution itself wants to beginning offering a MOOC or two, partnering with an existing MOOC provider presents probably the easiest course of action. Where an institution would like to grant credit for its students to participate in a MOOC offered by another institution, it may need to put into place new mechanisms, guidelines and practices if such things are not covered by existing accreditation bodies or schemes.

Where an institution (or a consortium of institutions) in a developing country wishes to set itself up as a MOOC provider platform, things are *much* more complicated, time-consuming, and expensive. World Bank experiences supporting initiatives such as the *African Virtual University* have shown that there are no shortcuts to developing and cultivating the administrative, pedagogical, financial, and technical capacities and infrastructure necessary for institutions to successfully offer online distance learning of various sorts. Even where such capacities and infrastructure can be developed within institutions, local technology ecosystems (e.g. sufficient competitive providers of reasonably-priced supporting goods and services) need to be in place to support both institutions and learners as well.

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7. MOOC technologies vs. MOOC platform providers

For a number of countries (or institutions within those countries), partnering with an established MOOC provider platform may not be of current interest, for a variety of reasons, including those related to things like national interests, institutional capacity and/or specific local contexts. Even where such cross-national partnerships may not be desired or possible in the short term, the specific technologies that power many of the established MOOCs may well be of interest and relevance. The technology tools to do this stuff will get cheaper and more powerful – and be more widely diffused. Already some very useful software tools have been *made available as open source* – good news for places not only trying to provide additional avenues for students to participate in higher education, but also trying to develop local technical capacity to develop, support, maintain and (through advanced data analytics tools) learn from MOOCs. There is no denying that many technical barriers
(e.g. lack of reliable, affordable broadband connectivity) and other challenges (e.g. Matthew Effects) will continue to restrict the potential relevance of MOOCs to certain populations in developing countries. That said, it is also safe to predict that, over time, more people will be able to access and benefit from online learning offerings (including MOOCs) in such places, both because they will be increasingly connected (as a result of greater availability of broadband and devices that are both more powerful and cheaper), and because there is are cohorts of more educated people emerging around the world as a result of progress made under the education for all movement of the last 20 or so years.

Side note: About 15 years ago I worked on a program that sought to connect students and teachers in 22 developing countries to the Internet, and each other, as part of collaborative learning activities. Some of the rationales for making such connections were based on the assumption that (e.g.) students in Uganda might want to connect to students in California. Such connections were made, and were seen to be of value to students and teachers in classrooms in ‘developed’ and ‘developing’ countries alike. Often of greater, and more sustainable, value were connections between teachers and students within a country itself, facilitated and enabled by the access to technology tools developed in large part in places like (e.g.) California. I wonder if there might be some lessons from this experience of potential relevance to some of the emerging MOOC providers ...

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8. MOOCs and mobile devices (like mobile phones)
If MOOCs are to be able to reach large numbers of learners in developing countries, they will need to be accessible on the connected ICT devices that these learners have available to them. In most of the world, this means things making MOOCs fully accessible via things like mobile phones. Whether and how this can/will be done may be key to the realization of ambitions of many MOOC providers in the coming years.

Side note: I wrote a post on the EduTech blog back in the summer about '10 principles to consider when introducing ICTs into remote, low-income educational environments', which was adapted for re-publication in the Globe & Mail. In the original post, I said nothing (at all!) about MOOCs. While I was delighted to have something I had written appear in one of Canada's most important news outlets, I was a little surprised to see it carry the headline "MOOCs don't help developing countries -- phones do". As I noted in a comment on the Globe & Mail site, there isn't an either/or choice here: There is sufficient room for lots of innovations to be introduced and tested to help meet wide varieties of needs of learners around the world. While we should be skeptical of the attendant hype around any new technological innovation to benefit educational practices and opportunities, we shouldn't let this skepticism blind us in cases where there is real value and opportunity. MOOCs, mobile phones (to say nothing of MOOCs on mobile phones ...) -- we are still in the early days of experimentation here.
9. The evolution of MOOCs

MOOCs are emblematic of some of the technology-enabled changes that are challenging ‘business as usual’ in some places, but perhaps don’t (yet) themselves challenge much of the usual business of education. Whether or not this changes, more people will be able to access MOOCs in the future: because there will be more of them, because connectivity will continue to improve and because there are emerging cohorts of educated people emerging around the world as a result of progress made under the education for all movement of the last 20 or so years.

One thing is clear: As relates to the practice and potential of MOOCs within education systems in middle and low income countries, we are still in the very early days. These things will change and evolve -- perhaps quite radically, in some cases. No matter how one feels about ‘MOOCs 1.0’, one expects that rapid iteration and evolution and learning (and ‘pivots’) are to be expected in the near future. While MOOCs as they exist today may not speak to the needs of many learners and institutions in developing countries, the next iteration (MOOCs 2.0?) may well evolve in response to contexts and realities and innovations in such places. (By the time MOOCs 3.0 roll around, let’s hope we have come up with another names for these things – or at least a more pleasing acronym!)

The Canadian ice hockey great Wayne Gretzky used to attribute some of his success to the fact that he would skate to where the puck is going to be, not where it has been. Given the pace at which MOOCs (and other technology-enabled innovations in education) are evolving, educational policymakers considering their relevance and utility in helping to meet their country’s and institution’s education goals might do well to (metaphorically) do the same.

10. _____

There is more I could say here, but I’ll stop now, as I’ve already gone on much too long. The list here is meant to catalog some of the things that I am hearing discussed at the end of 2013 related to the relevance of MOOCs in developing countries. It is certainly not comprehensive, and is presented in no order of importance. (I fully concede that what is *not* discussed can often times be just as interesting, and illuminating, and important.) Are these the most important issues and concerns that people *should* be talking about right now? In many cases, I suspect perhaps they are not, but my hope here is to share some of the reality that I am seeing and hearing—not what I think or hope this reality might or should be. As one small acknowledgement of my limitations when discussing this (quickly changing) topic, I have (as with other lists of ten that appear from time to time on the EduTech blog) deliberately left #10 blank here. Please feel free to add your own observations below.

You may also be interested in the following posts from the EduTech blog:
• MOOCs in Africa
• Making Sense of MOOCs -- A Reading List
• Missing Perspectives on MOOCs -- Views from developing countries
• Debating MOOCs
• 10 principles to consider when introducing ICTs into remote, low-income educational environments
• The Matthew Effect in Educational Technology

Note: The picture used at the top of this blog ("an award-winning mooc(ow), as Joyce might say"), is in the public domain and comes from Wikimedia Commons. The graphic of the Gartner Hype Cycle comes from Wikipedian Jeremy Kemp via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license. To learn more about the Gartner's trademarked Hype Cycle methodology, please see the related page on the Gartner web site.
Observing Turkey's ambitious FATIH initiative to provide all students with tablets and connect all classrooms
by Michael Trucano

#28: originally published on Wednesday, 18 December 2013


A number of places around the world have made very large, (hopefully) strategic investments in technology use across their formal education systems featuring so-called "1-to-1 computing", where every student has her own laptop or tablet learning device.

(I provided an annotated list of such places in an earlier EduTech blog post on Big educational laptop and tablet projects -- Ten countries to learn from).

One of the largest national initiatives of this sort is largely unknown outside that country's borders. To the extent that Turkey's ambitious FATIH project is known around the world, it is probably as a result of headlines related to plans to buy massive numbers of tablets (news reports currently place the figures at about 11 million) and interactive whiteboards (over 450,000 will be placed in classrooms, labs, teacher rooms and kindergartens). The first big phase of the project began in 2011 with 52 schools receiving tablets and interactive whiteboards as a sort of pilot project to test implementation models, with results (here's one early evaluation report) meant to inform later, larger stages of (massive) roll-outs.

The project's acronymic title, FATIH (which stands for Fırsatları Artırma ve Teknolojiyi İyileştirme Hareketi, or 'Movement to Increase Opportunities and Technology'), deliberately recalls the conqueror of Istanbul, Fatih Sultan Mehmet. Speaking at the project's inauguration, Turkish Prime Minister Recep Tayyip Erdoğan noted that, “As Fatih Sultan Mehmet ended the Middle Ages and started a new era with the conquering of İstanbul in 1453, today we ended a dark age in education and started a new era, an era of information technology in Turkish education, with the FATİH project.”

What do we know about FATIH, how might it develop, and how might lessons from this development be of interest and relevance to other countries considering ambitious plans of their own to roll out educational technologies?

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A World Bank report from earlier this year (*Promoting Excellence in Turkey’s Schools*) notes that “The education system in Turkey has shown remarkable improvement since 2003 in terms of better student performance and reduced inequality with a concurrent and sustained increase in enrollments.” Recently-released PISA results show that, when judged against a number of key metrics, the trend line is indeed positive. Will FATIH help to consolidate and extend recent gains, or will it be a misstep, criticised for inefficiently allocating resources to shiny new technologies instead of where investments are needed the most (a criticism directed at large scale educational technology initiatives in many other places in the world, such as the educational tablet project in Los Angeles Unified School District in the United States, which has seen its initial phases of rollout dogged by controversy and, indeed "chaos")? *Only time will tell, of course.* Advocates for, and critics of, large-scale investments in, and roll-outs of, educational technologies would do well to pay close attention to what happens in Turkey over the next five years, both in terms of results, and the means by which these results are sought.

As detailed on its main web site (here's the English version), the FATIH project has five main components:

- Providing Equipment and Software
- Providing Educational e-content and Management of e-content
- Effective Usage of the ICT in Teaching Programs
- In-service Training of the Teachers
- Conscious, Reliable, Manageable and Measurable ICT Usage

Unfortunately, there has to date been very little substantive reporting on, or sharing of lessons from, the emerging Turkish experience for audiences abroad. This is now, slowly, starting to change. A recent report from ERI, the Education Reform Initiative (*Egitim Reformu Girisimi* in Turkish) based at Sabanci University, and RTI International provides an invaluable introduction to what's been planned, what's been going on, and what may happen in the future, for international observers:

**Turkey’s FATIH Project: A Plan to Conquer the Digital Divide, or a Technological Leap of Faith?**

"Turkey is embarking on one of the world’s largest educational technology projects: putting tablet computers in the hands of every student from grade 5 to 12, and interactive whiteboards in every classroom. Though massive in its planned scope, the goals and approach of Turkey’s FATIH Project (The Movement to Enhance Opportunities and Improve Technology) are little understood. The objective of this brief is to analyze FATIH through the lens of ongoing and previous international, large-scale ICT in education experiences, and to use those experiences to suggest ways in which this important investment in educational technology can lead to the best possible learning outcomes for all students in Turkey."

One challenge that many large-scale initiatives of this sort face is the fact that, as massive as public sector investments in this regard may be, their ultimate success
(or failure) may depend in large part on the ability of other groups outside the formal education sector, including civil society, community groups, and private sector actors, to anticipate both gaps in what is being rolled out (and thus help fill them) and to sense where there may be real opportunities to complement and extend what is being financed by government (and then, to do things that will complement and extend them!). Hopefully this report from ERI/RTI will help in this regard.

At the core of the report is a set of recommendations, drawn from both Turkish and international experience, which the authors hope will resonate with policymakers and point the way to approaches, practices and activities that are worth strong consideration -- as well as away from the types of things that have been shown not to work in other places. For what it's worth, here are the ten major findings, recommendations and issues that I took away from the report:

1. The mere presence of technology will not improve school-level outcomes
2. The importance of out-of-school use of technology
3. The limits of national/central coordination (important, but not sufficient for success)
4. The value of local autonomy in many activities
5. The potential role of ICT teachers in schools in supporting teachers and catalyzing new, innovative practices
6. The danger that, if teachers are not continually supported (not only via 'one-off trainings') in practical, useful, contextually relevant ways, the "tablets risk becoming little more than digital desktops"
7. The potential to do very useful small-scale research activities within the project, which can then inform the larger project
8. Transparency around procurement can help catalyze support from groups outside government
9. The important links between transparency and effectiveness in investments such as these
10. The need to insulate the project from potential negative impacts of changes in government (should such changes occur)

In my attempts to shorten and paraphrase, I have no doubt done an injustice to the rich analysis of the authors on these (and many other) issues. Those who are still reading this blog post (and have not clicked over to other, more interesting things) are advised to read the report itself (or at least the short two-page summary).

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While the hardware procurements have perhaps thus far garnered the most attention, I am especially interested in how Turkey organizes things on the content side. With every student equipped with a tablet, connected schools and interactive projection devices in every classroom, there will be massive needs for useful, relevant, high-quality digital teaching and learning materials. As discussed in another post on the EduTech blog (in an admittedly different context), "As we move to a greater proliferation of devices, combined with the fact that we will be
accessing more content from multiple places, a greater value will be placed on the content, and how that content is used, rather than on any one particular device. Viewed from this perspective, the future of education is in the content, not the 'container'. It's about more than just content, of course -- it's also about the connections and the communities (students collaborating with each other, teachers supporting other teachers) that technologies can help enable, catalyze and support as well." The most eagerly anticipated presentation at the recent global symposium on ICT use in education in Seoul was about efforts underway to stimulate and catalyze the development of digital learning resources in Turkey for use by students, teachers, parents and other people involved in the education process. Current plans include single sign-in access for teachers to nearly 60 educational portals and content repositories. There are over 314,000 registered users on a national educational platform (and content is being made through other channels like YouTube as well). To what extent, and how, will educational publishers adapt to, and take advantage of, the planned ubiquity of ICT devices in Turkish classrooms and in the hands of Turkish students and teachers? Answers to this question will presumably be of broad relevance not only within Turkey itself, but also for ministries of education and educational publishers in many other countries. It may be of special interest for countries where the language of instruction is, for the most part, unique to that country.

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Coming up with metrics by which to measure the success of projects like what is happening with the FATIH project in Turkey is often complicated by the fact that they can seek to meet multiple, interrelated goals. The fact that a large-scale new initiative in a country's education sector can have multiple objectives is of course nothing new. When such projects seek (as was the case in Portugal, and in many other countries as well) not only to help improve teaching and learning, while at the same time to supporting the development of national private sector capacity so that local firms can grow and eventually compete internationally (and survive competition from international firms seeking to enter their domestic markets), attempts to measure 'success' can be even more complex. Long term developmental objectives related to the education of a country's youth to become healthy, happy and productive members of a society can sometimes stand in opposition to shorter term desires to strengthen the capacity of local industry. Such goals need not be mutually exclusive -- but it may be useful along the way to acknowledge where tension between them occurs. The ERI/RTI reports quotes an (anonymous) Turkish education official saying, "We are not determining which technology best fits specified education goals, it's the other way around; we are trying to make education fit the given technology.” Whatever the goals of large scale educational technology initiatives are around the world, this sort of sentiment often presages immense future disappointment. For educational policymakers around the world -- especially those in middle and low income countries -- looking to see what the near-term future of educational computing across an entire country's education system might look like, how it might be achieved, at what cost, and to what end, the Turkish experience over the next half decade may be one of the most enlightening. After reading the ERI/RTI report, I went back and read
similar policy notes prepared as part of a quite large World Bank education project a decade ago that helped finance much of the initial large scale investment in the use of educational technologies in Turkey. While the year, and the gadgets, were different, many of the messages and recommendations and issues were the same. Hopefully the lessons from that earlier project, the international lessons gathered in the ERI/RTI report, and the emerging lessons from the first phases of the FATIH project itself, will be useful to Turkish policymakers and practitioners alike as they implement this ambitious program in the coming years. There will no doubt be much learned along the way.

You may also be interested in the following posts from the EduTech blog:

- Big educational laptop and tablet projects: Ten countries to learn from
- Next steps for Uruguay’s Plan Ceibal (as well as other posts about the Uruguayan experience)
- Evaluating One Laptop Per Child (OLPC) in Peru (and an earlier related post)
- The Maine thing about 1-to-1 computing
- What happens when all textbooks are (only) digital? Ask the Koreans!
- Around the World with Portugal’s eEscola Project and Magellan Initiative
- The Aakash, India’s $35 (?) Tablet for Education
- Laptops for education: $10, $35, $100 and points in between (but not above!)
- Ten comments on 1-to-1 computing in education

Note: The striking image used at the top of this blog post of lightning on the outskirts of Ankara (“there’s something electric on the horizon in Turkey”) comes from Ayasli Habib via Wikimedia Commons and is used according to the terms of its Creative Commons Attribution-Share Alike 3.0 Unported license.
about the author

Michael Trucano, Sr. ICT & Education Specialist, The World Bank

Mike Trucano is the World Bank's Senior ICT and Education Policy Specialist, serving as the World Bank's focal point within the education sector on issues at the intersection of technology use and education. He leads the World Bank's related analytical work under its flagship Systems Approach for Better Education Results initiative as it relates to information and communication technologies (SABER-ICT). At a working level, Mike provides advice and support to education projects around the world supported by the World Bank seeking to utilize information and communication technologies in the education sector in various ways.

Mike is also the principal contributor to the World Bank's widely read and influential EduTech blog (http://blogs.worldbank.org/edutech).

Mike is a frequent public speaker on the use of ICTs in education around the world, and on ICT use for development (ICT4D) purposes more broadly. He has helped organize a number of FAILFaires, exploring how can people and organizations can more openly talk about, and learn from, 'failed' projects and initiatives, in the hope that sharing lessons from 'failure' might make 'success' more likely in the future. As part of his official duties, he co-chairs the World Bank's internal cross-sectoral thematic group on ICT and education, which helps to maintain the organization's internal knowledgebase on related topics and sponsors numerous speakers and knowledge-sharing events each year.

Mike previously served as the ICT and Education Specialist at infoDev, the multi-donor 'knowledge shop' within the World bank's Global ICT Department, where he coordinated activities related to information and communications technologies and the Millennium Development Goals (MDGs), especially as they related to education. He also led infoDev's work exploring the use of various low-cost ICT devices and managed the program's mobile banking work. Prior to joining infoDev, Mike was a core member of the team that developed 'World Links' the pioneering program which, beginning in the late 1990s, introduced computers and the Internet into education systems in 22 countries around the world.
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