

ICTs & Education: Issues and Opportunities

A draft background note[§] on the use of information and communication technologies in education, as an input into the development of the new World Bank sector strategies for the education sector and ICT sector

PROMISE AND POTENTIAL

Creative and innovative applications of information and communication technologies (ICTs) have long been seen as important potential tools to enable educational reform processes improving both *access* to education, and the *quality* of that education. The explosion of the Internet in the 1990s, the emergence of a variety of low-cost computing devices and increased diffusion of computers throughout society ushered in a wave of “ICT and education” policies and projects in developing economies around the world designed to prepare students to effectively engage in the information age. More often than not, and often despite rhetoric to the contrary, most initial programs focused largely on the technology itself, placing very little emphasis on the practical implications of the use of ICTs to meet broad educational objectives, focusing instead on more narrowly tackling issues related to basic ‘ICT literacy’. Most programs of this sort, which were often initiated in an attempt to address issues related to the ‘digital divide’, did not take a holistic approach to ICT, failing to link the educational goal of expanded ICT use to necessary associated reforms of the curriculum, student assessment system, pedagogical approaches in the classroom, and teacher training. One of the enduring difficulties of technology use in education is that educational planners and technology advocates think of the technology first and then investigate the educational applications of this technology only later. Even where initial efforts to bridge the digital divide have been deemed successful, such successes may be short-lived. A report recently published by the OECDⁱⁱ notes that a second digital divide is emerging, separating those with the competencies and skills to benefit from computer use from those without.

Since at least 2000, the emergence of an increasingly interconnected and digital world has begun to transform the demand for skills required by an *industrial economy*, focused on specific repetitive skills, to those demanded by a *knowledge economy*ⁱⁱⁱ, focused on finding creative solutions to an ever changing set of problems. Education systems have in general been slow to respond to this new demand. Where they have responded, they have typically tended to focus first on technical ICT skills and only recently have begun considering the full range of “21st century skills” which ask students to think creatively, problem solve, effectively communicate, identify and analyze existing information and create knowledge.

In step with changing educational objectives, and in part as a result of research on how people learn, a range of pedagogical approaches have also been advanced as the most effective ways to engage learners to develop this skill set. These approaches include student-centered learning, active learning, project-based learning, and inquiry based learning, to name just a few among many. While the integration of ICTs into the learning process holds great potential to enhance these pedagogies and the development of a “21st century skill set”, the implementation in most countries to date has fallen short of this promise. Despite two decades of large investment in ICTs to benefit education in most OECD countries, and increasing use of ICTs in education in developing countries, important gaps remain in the current knowledge base. In addition, there appears to be a dearth of useful resources attempting to translate what is known to work and not work in this field for policymakers and donor staff working on education issues in developing countries, especially those issues related to Education For All and other education-related Millennium Development Goals. In other words: ICTs are, broadly speaking, not (yet) transforming education -- despite the hopes of many reformers.

That said, *the potential for ICTs to help enable and further a variety of educational reform objectives remains undeniable – and, as we approach the beginning of the ‘third Internet decade’, perhaps even more*

compelling. Given the proliferation of a variety of information and communication technologies and devices throughout societies, it is becoming more and more clear that narrow approaches to the introduction and application of a particular technology device (computer classrooms for urban schools, for example, or educational radio for learners in rural areas) are insufficient. Most countries face significant challenges in harnessing their education systems to promote broader economic and social development plans. In increasing numbers of them, governments are articulating broad visions of the development of “information societies” in which widespread access to technology can nurture human capital, improve government services, promote culture, and support economic growth. The ICT sector is being targeted as a vehicle for this growth and social development, and the education sector has *crucial role* to play in such efforts. Exploring -- and realizing! -- the potential for ICTs to help make schools more productive and efficient than they currently are, transform teaching and learning into an engaging and active process connected to real life, and prepare the current generation of young people for the future workplace may be a key determinate of the future success (or failure) of such initiatives.

CHALLENGES AND OBSTACLES

One of the inherent difficulties common to general discussions of the use of ‘ICTs in education’ is that ‘ICTs’ encompass so many different things, and can be used in myriad ways to help address myriad challenges. In general, ICTs can be important drivers for educational reform, utilized as a lever for organizational change, as a vehicle to introduce new teaching and learning practices and/or as an enabler of restructuring of the educational system. ICTs can be used to extend access to educational delivery models, to support the ongoing professional development of teachers, and to facilitate education-related data collection and processing efforts in ways previously not possible^{iv}. ICT infrastructure – national research education networks (NRENs) are a great example – can provide a fundamental building block upon which whole sets of knowledge and information services and activities can be enabled. ICTs can help in anti-corruption efforts in the education sector. Emerging ICT tools offer new opportunities to develop some of the critical early literacy skills, the development of which is *fundamental* if the large numbers of low-literate learners in World Bank client countries (especially in rural areas) are to be able to take advantage of the educational opportunities presented to them through expanding access to formal education. That said, changes and innovations in technology come much faster than changes in the education system, and the product cycle of most ICT-related products is much faster than the ‘life-cycles’ of education change and reform. This disconnect is important. A lack of congruence between the timelines for roll out of educational reform efforts and the roll out of supporting ICT tools (hardware, software, training) is a potential area of great challenge, as reform may be dependent on technologies that are no longer available (and/or supported). Even within a particular educational reform process, or indeed where no reform process is on-going, the pace of technological innovation outruns the pace of institutional innovation.

While some groups feel that the introduction of ICTs in an education system offers the opportunity for students to learn by themselves, obviating (in whole or in part) the need for teachers, there is no compelling evidence to support such approaches system-wide. In fact, global experience highlights just how vital teachers are if roll-outs of educational technologies are to be effective. Far from relegating teachers to the periphery, educational technology initiatives around the world are demonstrating that the enabling investments are only as effective as the teachers who are central to them.^v

Introducing ICTs raises important – and acute – equity issues^{vi}. There is a real danger that uses of ICTs can further marginalize groups already excluded or marginalized from existing educational practices and environments. That said, ICT use also holds very real promise and opportunity for facilitating greater inclusion of such groups – who may include special needs students, learners in remote areas, students from historically marginalized linguistic, cultural or ethnic groups, and low income communities – into existing educational

practices and environments as well. It is increasingly apparent that providing access to ICTs within the formal education system may not be sufficient, however, as emerging research is pointing to how access and use of ICTs outside the school environment can have very strong implications for the use of such technologies in schools. In addition, it may be in the area of the promotion and enabling of learning *outside of formal education* settings, whether among the vast numbers of children out of school, or to promote life-long learning by people of all ages, that the potential for ICT use may be most immediately compelling^{vii}. A widely-cited aphorism in educational technology communities in OECD countries holds that ‘ICTs are transforming education everywhere but in the classroom’. A standing challenge for education systems going forward will be to take advantage of the opportunities provided by ICTs to support learning outside of schools while at the same time incorporating ICT-related practices and models from daily life in wider society into formal educational structures and processes.

Within the World Bank, most people associate ICT use in the education sector predominantly with efforts to provide computers to schools, and to connect these schools to the Internet. While such associations are undoubtedly consistent with most World Bank support for investments in ICT use in education in the past, they are of limited utility when considering how a wide variety of ICT tools, services and approaches will be relevant to the needs of education sectors in countries going forward. An effort to catalogue the potential ‘options’ for potential uses of ICTs in education in 2010 should include attention to a broad range of devices, not limited to computers and laptops. Such a ‘catalogue of options’ circa 2010 may be of little relevance, however, when considering the potential relevance of ICT to education sector strategies through 2020, except to the extent that they point to the increased proliferation of a variety of ICT tools of potential relevance to the education sector in just the past few years (not only low-cost laptops, but also mobile phones, interactive whiteboards, IP TV, interactive response devices, tablet devices like the iPad, so-called ‘probeware’ and other ‘connected’ scientific equipment used for learning, radio, television^{viii}, gaming consoles and devices ... the list is quite long^{ix}) as a harbinger of things to come. The increased diffusion of ICTs will offer potentially relevant ‘solutions’ to challenges not only at the core of the teaching and learning process itself, but also to challenges to the system such as (to cite just three examples) monitoring teacher attendance, transfer and payment of salaries and the mapping of student populations and the educational resources meant to serve them (e.g. schools).

It is important to note that the widespread procurement and diffusion of computers and other devices throughout education systems brings a corresponding assumption of a variety of often poorly understood environmental liabilities, especially where inadequate laws and regulations are in place related to the make-up and disposal of such items, and where there are insufficient numbers of local organizations and processes to handle such disposal^x.

Even where the initial costs of reform efforts utilizing ICTs can be borne, ensuring sufficient funding over time to ensure the success of such programs can be challenging. Indeed, the financing mechanisms utilized to fund the initial deployment of ICT hardware and software as part of various initiatives in the education sector may not be available -- or practical -- to sustain such investments over time. Complicating funding scenarios in many countries is that the total cost of operation (TCO) of ICT in education initiatives is often underestimated (often quite profoundly) during planning stages. (Estimates of initial costs to overall costs vary widely; typically they lie between 10-25% of total cost.) Creative solutions – often realized through public-private partnerships – are often required as a result^{xi}.

Despite the high costs often associated with the use of ICTs in education, an international consensus holds that insufficient attention is paid to monitoring and evaluation issues and feedback loops during the program design process of most ICT in education initiatives. In general, many of the issues and challenges associated with ICT in education initiatives are known by policymakers and educators. However, data on the nature and extent of these issues remain limited in most places because of the lack of monitoring and evaluation tools and

methodologies dealing with the use of ICTs in schools and their impact on teaching and learning. It is generally believed that ICTs can empower teachers and learners, promote change and foster the development of '21st century skills, but data to support these beliefs are still limited. This fundamental disconnect remains a vexing challenge for policymakers.

IMPACT

Let's be clear: There is much we still do not know about the impact of investments in this area^{xiii}, and the related overall costs^{xiii}. We do not have a good handle on how to measure the types of impacts we hope to bring about through the introduction of '1-to-1 computing', which often go beyond what is measured through existing standardized assessments of learning. With very few exceptions, there are very limited data published to help us understand the costs of such initiatives, especially those related to the total cost of operation over time, and the way such costs are calculated are often not very transparent. This means that, collectively, we are often unable to answer a basic question posed by finance ministries seeking to discriminate between numerous worthy projects and initiatives contending for investment: *how much 'impact' will this get me, and what will this 'impact' cost me?*

While there is much that we still do not know about the 'best' or most effective models for the diffusion and utilization of ICTs to meet a variety of educational objectives, and many questions remain about the impact and cost of investments in ICTs, appropriate models and good practices are emerging, and knowledge about such models and practices are slowly diffusing (a diffusion typically accelerated, it should be noted, through the use of ICTs themselves). Even where costs are considered high for investment in this area, and impact evidence is still fragmentary, policymakers are confronted with a further policy challenge: *What is the cost of not investing in this area?* Can we afford to wait, many leaders ask, until concrete evidence is available about the impact and costs of such investments over time, and which implementation modalities are considered 'best practice'? If they delay, and don't invest now, many countries are afraid that they may be outpaced by other, more 'daring' societies ready to make bold investments to compete in an increasingly technology-driven global economy. There is, regrettably, no simple answer to such questions, no pat answer to allay such fears. Some advocates for action recall the words of Nobel laureate in economics Robert Solow, who remarked back in 1987 that 'You can see the computer age everywhere but in the productivity statistics.' You could say the same today for the impact of computers in education, they say – but look at the economic growth that the past twenty years of investment in ICTs has brought about in many places in the world.

Together with a perceived *economic imperative* for investment in this area, and a soft-articulated *educational imperative*, there is quite often a *political imperative* for action in this area. Educational reform is difficult, and many of the most profound and important results of action may not be seen for generations. In the face of opposition to reform, the purchase of computers for schools (for example) can provide a useful, tangible symbol of a commitment to investment in change, and ICTs themselves can potentially provide important vehicles to help bring about desired reforms. It is then the collective responsibility of a society, from its political, economic and educational leaders, to teachers, parents, students and local communities, to transform the exciting potential offered by the so-called ICT revolution into tangible results, aided by a strong commitment to evaluating the impact of various initiatives and practices, and learning from the results.

THE WORLD BANK

As technological advances continue to impact societies in new and unexpected ways, the World Bank will face increasing challenges from a human resource perspective if it wishes to be able to offer relevant, timely advice to its clients, direct its investment monies in forward-thinking and cost-effective ways, and participate in and learn from dialogues with stakeholders and critics alike about appropriate, locally-relevant, cost effective approaches to address the challenges placed upon education sectors all over the world. These challenges – both the

seemingly intractable challenges inherited from the 20th century, together with the new challenges presented by an increasingly globalized and interconnected societies and economies – will test the knowledgebase and skill sets of World Bank staff in the education sector. A continuous *upgrading of staff skills*, and the creation of processes to promote consideration of new approaches and ideas from outside the World Bank, especially born of local innovations ‘on-the-ground’, will be necessary if World Bank money and advice is to remain relevant and effective. This is true for World Bank staff in general, inside and outside of the education sector, but will be particularly acute for education sector staff going forward as a result of the continued rapid diffusion and application of new technologies within broader society.

One of the challenges facing the World Bank as it attempts to respond to client requests for funding, technical assistance and/or advice related to the use of ICTs to benefit a wide variety of education objectives is that Bank experience itself in this area is limited – and where it does exist, is little studied. Even identifying where the Bank has provided support for ICT-related components within education sector projects is often quite difficult, as numerous internal studies have documented, due to the way that the Bank’s internal information systems ‘code’ such project components, which have greatly complicated attempts to quantify (for example) the ‘size of World Bank investments in ICT and education’ in ways that are operationally relevant^{xiv}. Few if any rigorous assessments of the impact of World Bank investments to support ICT use in education exist^{xv}. Even where there is a (thin) evidence base from World Bank experience in this area^{xvi}, such experience in the *past* may not always be relevant to World Bank project preparation, technical assistance and country dialogues *going forward*. That said, there is increasing evidence, from inside and outside the Bank, on *what doesn’t work*, and lessons from various ‘failures’ can be valuable inputs into future project planning activities^{xvii}.

A further structural challenge within the World Bank relates to the fact that ‘ICT use in education’ spans two separate and distinct ‘sectors’ within the Bank bureaucracy – those of both the education and ICT departments. This dual nature of responsibility and action corresponds to the bureaucratic structures in most Bank client countries, where responsibility for ICT use in education is often divided – in a shared or parallel fashion – between ministries of both education and ICT (or their functional equivalent). Investing in *cross-cutting* initiatives and responding to client requests that are cross-cutting in nature have often proven to be a challenge to the World Bank in the past; such challenges will no doubt prove even more immediate and fundamental in the coming decade, and the Bank’s considerations of the appropriate and relevant use of ICT use in education will most likely be no exception.

One way for the World Bank to help better equip its staff^{xviii} working in the education sector to meet such challenges is to further open up the institution to the use of tools and processes driving technological innovations in the private sector, civil society, government and daily life of the people the Bank was established to serve. In Silicon Valley, this approach is rather memorably (if indelicately) referred to as ‘eating your own dog food’ – if the Bank expects governments and other developmental partners to ‘buy’ its advice, products and services, it should be willing to use them itself. Increasingly, these activities will be enabled and colored by the use of information and communications technologies in multiple ways; such use internally may well impact the Bank’s ability approach to engage successfully with its developmental partners to explore, advocate for, and implement cost-effective, innovative approaches to tackling developmental challenges that sometimes seem intractable, both within the education sector and beyond.

MOVING FORWARD

Moving forward, the World Bank may wish to consider the following general principles^{xix}:

- ***Pursue holistic approaches to the use of ICTs in education.*** Most ICT/education initiatives succeed or fail based not only on sound implementation practices, but on the nature and quality of broader educational policies and strategies in which the use of ICTs is embedded. Technology is only a tool: no

technology can fix a bad educational philosophy or compensate for bad practice. Considerations of the potential use of a variety of ICTs should be based not on a desire to introduce ICTs *per se*, but rather flow out of considerations of specific developmental challenges; ICTs of various sorts should always then be considered (if perhaps not chosen) within a larger universe of tools and approaches for consideration. Whether or not ICT-related investments in education are considered to be part of the portfolio of the education sector, the ICT sector (or elsewhere), concerted efforts need to be made to ensure knowledge sharing and consistency of response and approach across all relevant sectors.

- ***Use investments in ICTs not only to promote the development of basic ICT skills, but also to enable the development of a broader set of critical thinking, problem-solving and communication skills.*** The development of basic competencies in computer operations, keyboarding, and office productivity software is important; however, the development of such skills should not only be seen as an end in themselves, but also as a potential aid to the development of a set of more fundamental '21st century skills'.
- ***Be careful of making big bets on a singular technology (or vendor).*** Technology changes -- and often quickly. Overreliance on a particularly promising technology solution today may inhibit an education system's ability to adapt tomorrow, as new technologies emerge (and they always do). Educational priorities should drive technology choices -- and not the reverse.
- ***Special attention should be placed on the professional development of teachers.*** Teachers are at the heart of the educational process. The introduction of ICTs does not change this fact – in fact, it typically makes the position of the teacher *more* important. While most large-scale professional development schemes for teachers in developing countries related to ICTs have focused largely on promoting the development of 'ICT literacy', the scope for ICT use to help support and extend the work of teachers goes far beyond the mere acquisition of a narrow set of ICT skills. ICTs can also play valuable roles in upgrading the subject-specific competencies of teachers (through, for example, increased access to quality education content, distance learning opportunities, and self-paced tutorials), and, more fundamentally, in building formal and informal support networks, at both the pre-service and in-service levels, to enable teachers to explore the use of new tools and techniques to help engage with and support learners in new and productive ways.
- ***Monitor and evaluate regularly and closely -- and be prepared to change direction.*** Introducing ICTs into the teaching/learning process is an *innovation*, sometimes requiring radical changes. Providing schools with hardware and software does not automatically reform teaching and improve learning. Don't underestimate the disruptive nature of ICT/education investments. Success requires meeting all the conditions for innovation and change to occur, including stakeholder engagement, relating the innovation to the conventional, articulating the added value of ICTs, assessing and mitigating risks, and planning for and implementing necessary change management processes. The Bank may wish to consider dedicated funds to help monitor and evaluate the use of ICTs to meet a variety of educational objectives as a mechanism to ensure that the institution learns from its own experiences in this area, as well as those of others.
- ***Proactively ensure that World Bank staff have the necessary knowledge, skills and tools to respond to, and take advantage of, the challenges and opportunities that technological advances present to addressing key developmental challenges in the education sector.*** Ask people to draw a 'school of the

future' and you will get a great diversity of portraits. In almost all of them, however, technology will play an (increasingly) important and prominent role. For the Bank to remain relevant, it must ensure that its staff are well-equipped to anticipate and respond to challenges and opportunities that ICTs present, and represent, in helping education systems meet not only the Millennium Development Goals, but to participate productively and equitably in an increasingly technology-rich, knowledge-driven world.

More broadly, **the World Bank may wish to consider 'imagining the needs of learners' going forward in an effort to better understand what challenges the 'education systems of the future' may be challenged to address.** Few would doubt that ICTs will both present significant challenges, and offer potential tools to help address such challenges, for education systems going forward. The idea here would not be to attempt to 'predict' the future (surely a *fool's errand*, as Niles Bohr famously remarked) and an activity for which the World Bank education sector would appear to have little comparative advantage (especially when it relates to technological advances!). Rather, doing so might be a useful mechanism to help ensure that evolving Bank education and ICT sector strategies, and the various tools Bank deploys to help realize these strategies, remain relevant to its clients over time as they seek to help provide all of their citizens with a quality education.

END NOTES

[§] This short background note, drafted for internal audiences, draws heavily on existing World Bank papers and documents, published and unpublished, and internal correspondence. For a list of external World Bank publications on topics related to ICT use in education, please see <http://go.worldbank.org/OP34IHT1J0>. Many internal documents have been catalogued on the World Bank internal EduTech knowledgebase wiki, available through the Bank's Intranet, which also contains a large bibliography of ICT/education-related studies. Inputs were provided by many members of the World Bank's EduTech thematic community of interest on ICT use in education. For more information about this community, including a list of its members, please see the related page on the World Bank Intranet. The principal author of this background note is Michael Trucano, who assumes all responsibility for errors, including those of omission; credit for whatever insights this document contains, however, belongs to the Bank's larger EduTech community. **Comments are welcome.**

ⁱⁱ OECD (2010). *Are New Millennium Learners Making the Grade? Technology Use and Educational Performance in PISA*.

ⁱⁱⁱ The flagship World Bank publication on this topic remains the 1998-99 World Development Report, *Knowledge for Development*.

^{iv} This topic – especially as it relates to use of *Education Management Information Systems (EMIS)*, support for which is found in most World Bank education projects in one way or another – is addressed in a separate background paper commissioned as part of the World Bank education strategy 2020 process. See Porta, E. (draft 2010), *Increasing Education Data Availability for Knowledge Generation* (2010).

^v A useful discussion, including numerous examples, can be found in Gaible, E. & Burns, M. (2005) *Using Technology to Train Teachers: Appropriate Uses of ICT for Teacher Professional Development in Developing Countries*.

^{vi} See, for example, Wagner, "D. Pro-Equity Approaches to Monitoring and Evaluation: Gender, Marginalized Groups and Special Needs Populations" in infoDev (2005) *Monitoring and Evaluation of ICT in Education Projects - A Handbook for Developing Countries*.

^{vii} One discussion of this can be found in infoDev (2010). *ICT in Non Formal Education*, which looks specifically at the South Asian context.

^{viii} The use and impact of educational radio (including through so-called *interactive radio instruction*) is perhaps the ICT application most lauded by World Bank staff when discussions of ICT use in education occur internally. That said, the Bank has provided little support for such activities itself, although it has produced a related study, *Improving Educational Quality through Interactive Radio Instruction: A Toolkit for Policy Makers and Planners* (2005).

^{ix} Those interested in such a list may be interested in the related World Bank EduTech blog post on *Cataloguing low cost ICT devices used in education* (2010).

^x At a World Bank BBL event on 30 August 2010 (*One Laptop Per Child in South America: Reports from on-the-ground*; <http://go.worldbank.org/A89FIW44V0>), a speaker estimated that the public sector in Uruguay, where all public school primary students have been provided with a free laptop, with roll-out of laptops for secondary students to commence shortly -- will account for almost half of all e-waste liabilities in the country within three years. Whether or not this data point is correct (there have no definitive studies on this issue released to date), the looming issue of e-waste looms large for most developing countries. See for example the UNEP web site (2010). *Urgent Need to Prepare Developing Countries for Surge in E-Wastes*.

^{xi} A notable example of the use of public-private partnerships to further the use of ICT in education can be found in the Jordan Education Initiative. For more information, see McKinsey & Co. (2005) *Building Effective Public-Private Partnerships: Lessons Learnt from the Jordan Education Initiative*.

^{xii} See, for example: Trucano, M. (2005) *Knowledge Maps: ICT in Education*; a list of noted research papers on this subject can be found in the *Quick guide to some notable studies related to the evaluation and impact of ICT use in education* (internal World Bank knowledgebase wiki, last updated 2010).

^{xiii} The best discussion of the costs of ICT use in education in developing countries is probably GeSCI. (2008) *Deploying ICT in Schools: A framework for identifying and assessing technology options, their benefits, feasibility and total cost of ownership*.

^{xiv} These papers include: Trucano, M. (2010) *Quick guide to identifying ICT components in World Bank Education projects*; *Quality of Information and Communication Technology (ICT) Components in Bank Projects: A QAG Assessment* (2006); Moreno, J.M, Sosale, S. & Sarna, N. (2006) *A Review of ICT Components in World Bank Education Projects (2001-2004)*; Trucano, M. (2005) *ICT Components in World Bank Education Projects*; Georgiades, K. (undated, believed 2002) *Technology in World Bank Education Projects*. To help locate certain types of uses of ICTs within World Bank projects, the World Bank's EDSTATS project features database now highlights eight 'project features' that are ICT-related, based on a manual review of PADs for projects in the Bank's education sector portfolio.

^{xv} This is not to say that this topic has *not* been the subject of any World Bank research. Numerous papers have examined the impact of various pilot programs associated with the World Links program, for example, an ICT/education initiative supported by the World Bank Institute that started in 1997 and was later spun-out as a separate NGO. A few World Bank papers have looked at the impact of ICT/education programs that have not received World Bank support (a salutary example is Barrera, L, Linden, L. (2009) *The Use and Misuse of Computers in Education*, which looked at Colombia) and lessons from specific large-scale ICT/education initiatives at a country level (for example, Hepp, P. et al (2004) *Technology in Schools*, which looked at Chile's Enlaces program) A forthcoming World Bank publication intends to look at the example of the Russia e-Learning Support Program, which to date is the largest stand-alone World Bank ICT/education project.

^{xvi} Perhaps the most notable World Bank ICT/education projects to date, and certainly the largest, have been two investments in Turkey (*Second Basic Education Project* and *Basic Education 2 Project – APL#2*) and the Russia *E-Learning Support Program* project. In addition, it is worth noting that perhaps the highest profile new large-scale ICT/education project in a developing country of the past decade, the Jordan Education Initiative, was in many ways enabled by the existence of the World Bank-funded *Education Reform for the Knowledge Economy* project. Beginning in the late 1990s, the World Bank initiated a few small but notable ICT/education programs that were of a global or regional nature, including the World Links for Development program, the African Virtual University and the Global Distance Learning Network.

^{xvii} See, for example, Trucano, M. (2010) *Worst practice in ICT use in education* and proceedings from the recent 'FailFaire' organized by the World Bank Institute (covered in Strom, S. *Nonprofits Review Technology Failures*, NY Times, 16 August 2010).

^{xviii} The World Bank education sector anchor unit has been engaged in an on-going effort over the past 18 months to interview World Bank staff to determine knowledge and capacity-building needs related to ICT/education topics and to better calibrate World Bank knowledge services to these needs. A summative paper on this experience is expected in late 2010.

^{xix} These suggestions are adapted, in part, from Haddad, Wadi D. (2007), *ICT in Education Toolkit for Decision Makers, Planners and Practitioners* (2007) prepared for infoDev (World Bank) and UNESCO, <http://www.ictinedtoolkit.org>.