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Education for All 2000-2015: achievements and challenges

Evolution of policies towards equitable access to information and communication technology skills for youth and adults

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2015

Evolution of policies towards equitable access to information and communication technology skills for youth and adults

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ICT for learning, an emerging agenda

Basic ICT skills have become an essential form of literacy, and essential also to economic development. ICT was barely mentioned at the Dakar forum. However, the G8 meeting in Okinawa on 2000 resulted in the Okinawa Charter on Global Information Society (G8, 2000) and declared a commitment to provide all citizens with the "opportunity to nurture IT literacy and skills through education, lifelong learning and training." Thereafter, ICT skills have been theorized to increase productivity in three ways: *capital deepening*—the use of more productive, better equipment; *high quality labour*—a more knowledgeable workforce; and *technological innovation*—the creation, distribution and application of new knowledge (Kozma 2008).

It is important to recognize that technological access alone does not necessarily lead to digital literacy skills nor the anticipated educational benefits. For example, results from both PISA 2009 (OECD 2011a) and PISA 2012 (OECD 2014) show that use of computers for learning in schools had different impacts on students' digital reading literacy and mathematics problem solving respectively in different countries. As Jenkins (2009) points out, the learning of media literacy skills would require giving learners the opportunities for participation to develop the necessary cultural and social competence. The One Laptop Per Child (OLPC) project is the most well known ICT for learning project in developing countries, aimed at bringing each child a rugged, low-cost, low-power, connected laptop. More than 2 million children and teachers in Latin America and another 500,000 in Africa and the rest of the world are using XO laptops. However, formal evaluation studies of the OLPC program are rare (Nugroho and Londsale, 2009), and few positive effects were found in the most rigorous study to date, in Peru (Cristia et al., 2012). A fundamental challenge to achieving ICT literacy is the techno-centric assumption that when students are given access to technology, they will be able to achieve good educational outcomes (Fajebe, Best and Smyth, 2013; Kraemer, Dedrick and Sharma, 2009). The introduction of IT for educational improvement in developing countries needs to be planned and implemented as a systemic innovation that includes not only the provision of hardware and software, also considers the education and social ecology: teacher learning, leadership development, curriculum, assessment and pedagogy, infrastructure and support (Kraemer, Dedrick and Sharma, 2009; Kampylis, Law and Punie, 2013). The examples of Chile, Rwanda, and China offer valuable experiences for how ICT can be planned.

National ICT in Education Strategic Developments: some examples

Chile. The first ICT initiative of Chile *Enlaces* (www.enlaces.cl), was launched in 1992, with a goal to integrate ICT effectively into the educational process. By 2000, Chile had already distributed 38,000 computers to a total of 5,300 schools, and equipped them with Internet access. *Enlaces'* vision was for ICT to be used as a tool to support teaching and learning, and become an integral part of curriculum support In particular, it encourages the use of ICT for connecting Chilean schools with the rest of the world through school projects. (Hinostroza, Hepp & Laval, 2000). In 2007, the Chilean government invested USD 200 million for implementation of ICT in the Technologies for Quality Education Plan (Plan de Tecnologías para una Educación de Calidad - Plan TEC) (Chile MOE, 2007a). One of the Plan's goals was to narrow the digital divide by improving access to computers and Internet connectivity. The specific target was to lower the student:computer ratio from an average of 24:1 at the time to 10:1, to reach the levels of provision in developed countries such as Spain. In 2008, Chile released a very complete and detailed Matrix of ICT skills and

performance levels for students, which it updated in 2013, providing a list of ICT-related learning outcomes grouped into four skills dimensions: information, communication and collaboration, digital coexistence and technology (see Table 3x).

Table 3x: ICT skills for students as defined in Chile Ministry of Education (2013a)

Dimension	**Students' ICT Skills**
Information	• Define the information needed • Search and access information • Evaluate and select information • Organize information
Communication and collaboration	• Use social protocols in digital environment • Present information appropriate for the audience • Transmit information taking account of the purpose and audience • Collaborate with others to develop an information product
Digital co-existence	• Identify opportunities and risks in digital environment, and implement strategies for protection of self and others • Knowing own and others' rights, and implement strategies to protect information in the digital environment • Respect intellectual property • Understand the social impact of ICT
Technology	• Master basic ICT concepts • Safe and careful use of equipment • Solve technical problems • Know advanced ICT applications

China launched a comprehensive curricular reform in 1998 (PRC MOE, 1998) focused on improving human resources to meet the demands of the knowledge era. The action plan included statements about the importance of achieving *informatization* of education as an integral part of this ambitious reform plan (Li 2003). Shortly after the launch of this reform, a special project was started to establish a good technology infrastructure for the delivery of high quality distance education throughout the country (Xie et al, 2003). Next, in 2010, China launched the *State Guidelines middle- and long-term education reform and development plan* 2010-2020 (PRC MOE, 2010), the goal of which was to build a future-oriented learning society that focuses on nurturing human resource capacity through education provisions that enhance national innovation capacity and support modernization. This was followed by the publication of the first formal ICT in education policy for China, *Education and Information Technology Ten-Year Development Plan 2011-2020* (PRC MOE, 2012). This document puts forward a different strategic direction for the role of ICT in education from that in the 1998 education reform action plan. In line with the 2010 education reform goals of fostering national innovation capacity and supporting modernization, the strategic objectives for ICT implementation are to: a) narrow the digital divide in rural areas, b) build collaborative learning networks, c) develop quality digital resources and support online life-long learning, d) improve network infrastructure, e) improve teachers' ICT use, and f) improve standards and establish information security. At the same time, China launched three ICT programs for adults in rural areas of China (Wang 2013).

Rwanda. In Rwanda, ICT4D (ICT-led socio-economic development) was the core policy focus for Vision 2020 (GOR, 2000). Four National ICT Infrastructure Plans (NICIs) were envisaged to be needed to achieve the vision, and to-date three plans have been launched by the Quinquennial National Information Technology Commission (NITC) since 2000. International agencies such as the Economic Commission for Africa, USAID, UNDP, and the

Carnegie Foundation were invited to engage as partners from the start. Of the eight core strategies identified for the realization of Vision 2020, two were directly related to ICT in education: to transform Rwanda into an IT-literate nation and to improve accessibility, quality and national developmental relevance of its education system by ICT-led transformations.

The education sub-plan within the first NICI (2000-2005) included ICT training for primary and secondary teachers, development of e-learning content, establishment of a national library network, implementation of an educational management system, development of a national SchoolNet to provide Internet access, resource sharing and international networking for schools, the development of a national computer curriculum for primary and secondary schools, and the establishment of a regional information technology training and research institute for Rwanda and the region.

In 2010, Rwanda evaluated NICI to "[solidify] the foundation for ICT development and achieved the plan's main goal to deploy world-class ICT infrastructure" (GOR 2010, p. 16). The third NICI plan (2010-2015) has consolidated goals into five areas: skills development, e-government, community development, cyber-security and private sector development. The skills development area included six key projects, which form a clear and focused set of implementation strategies: ICT Professional Training and Certification Programs, SchoolNet, ICT Training for Teachers, Rwanda Education and Research Network **(**RwEdNet), Open, Distance and e-Learning (ODEL) and Digital Library (see Figure xx below).

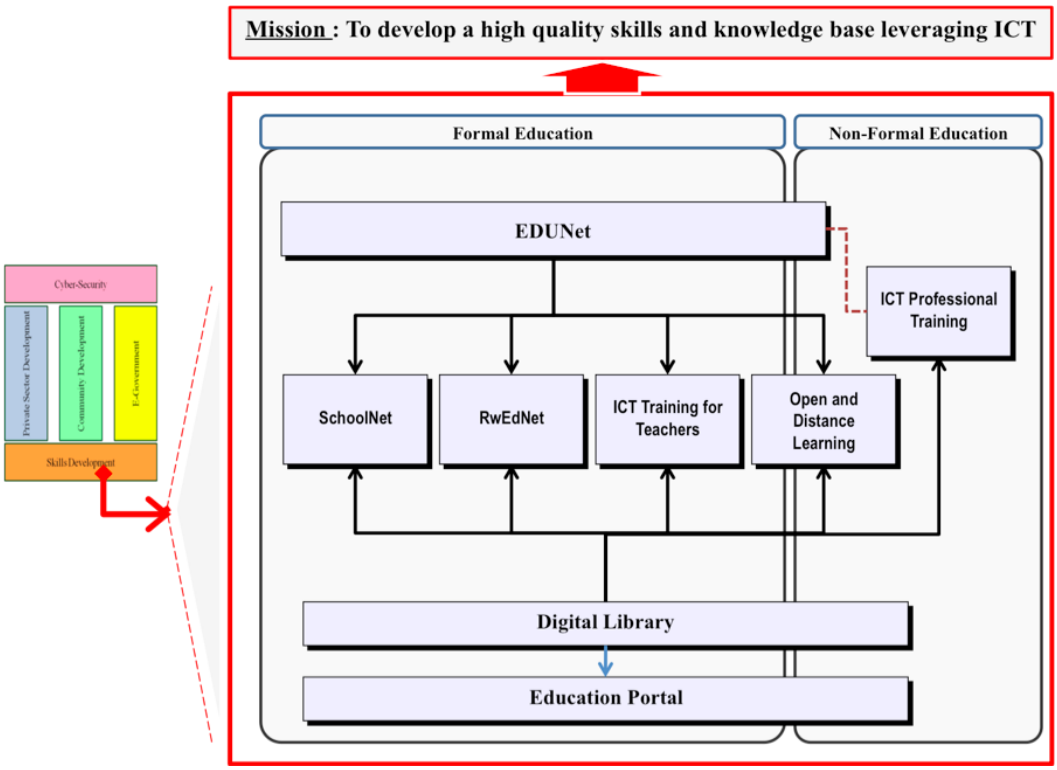

Figure xx. Skills development focus area projects NICI (2010-2015) (GOR 2010, p. 29).

A set of ICT Competency Standards for Rwandan teachers and implementation guidelines (Rwanda MOE, 2010) was developed by the Ministry of Education in partnership with the Global e-Schools and Communities Initiative (GeSCI). These standards modeled on the UNESCO's ICT Competency Standards for teachers (UNESCO, 2008) and encompasses six aspects of a teacher's work: education policy, curriculum and assessment, pedagogy,

ICT, organization and administration, and professional development. However, the ICT competency standards for students are yet to be developed.

In relation to adult education, Rwanda has challenges given that 45% of its population lives under the poverty line and only 63% of households even owned a radio in 2010 (The World Bank, 2014). Hence, the use of ICT for adult literacy is still largely out of reach for the government of Rwanda. There are adult literacy centers run by some religious organizations and NGOs (Okech & Torres, 2005).

Impact and achievements of policy implementation

Chile. By 2010, implementation of the ICT policy in Chilean schools has resulted in: a) 120 000 teachers trained on ICT use, b) 60% of schools had Internet access, c) 90% of students in public schools had access to computers, and d) a student:computer ratio of 9.8 in schools (Donoso, 2010). Findings from the Test for Measuring ICT Skill for Learning (SIMCE TIC) conducted by the Chilean government launched in 2011 showed that 46% of the 10,321 tenth grade students tested only achieved basic ICT skills and did not reach the minimum level expected, 50.5% had intermediate level ICT skills that met the skills requirements, and only 3.3% of the students reached advanced level of ICT skills by demonstrating their ability to use ICT to tackle higher order cognitive tasks (Chile MOE, 2012). Another observation is that higher levels of ICT are associated with higher socio-economic background in Chile. Jara's (2013) and Claro et al's (2012) studies indicate that the general inequity in the Chilean education system has not been reduced by the introduction of ICT, and that there is a danger of a second digital divide emerging. Equity issues in the Chilean education system need to be resolved in order for economic development to bring progress to all its citizens (Cabalín, 2012; Espinoza, 2012; Somma, 2012; Viñas, 2011).

China's ICT in education plans started with a focus on building its infrastructure, with a focus on distance education. Xie et al (2003) reported the successful establishment of a distance-learning network for rural areas. By the end of 2007, about 402,000 multimedia education kiosks were set up in remote areas, around 208,000 satellite stations were constructed for key rural primary schools, and 45,000 multimedia classrooms were established in rural secondary schools to study information technology (KPMG-HK, 2010). In addition to an improved infrastructure, examples of successes in the use of ICT to reduce the illiteracy rate in districts and towns were reported by UNESCO INRULED (2012), Another educational impact of ICT is in the increase of virtual schools. In 2012, there were around 200 online schools serving around 600,000 students, mainly in the big cities; but also in rural areas (Pepler & Andries, 2012). These online courses are provided through diverse partnerships involving different combinations of government, private sector and school participation.

Rwanda. The government has achieved much in the introduction of ICT in education since 2000, when ICT was almost non-existent in schools. At the end of the first NICI, 1,138 out of 2,300 primary schools had at least a PC or a Laptop, close to 2,000 PCs were deployed in the secondary schools, with a further plan to deploy 4,000 computers in 400 schools in the 2005-2006 school year. Internet access increased from 1 school in the entire nation to 40 schools in Kigali City, and in a few schools in other urban and rural regions. In addition, about 1000 teachers in 120 primary schools and over 2000 secondary school teachers throughout the country have been trained in computer literacy and basic computing.

By 2010, in addition to improving ICT access and the training of teachers, a number of socio-technical infrastructures had been established to support the improvement and transformation of education in Rwanda:

- Rwanda Schoolnet—to improve connectivity and the deployment of ICT tools in primary and secondary schools;

- RwEdNet—to connect Rwanda's institutions of higher learning with global education and research networks;
- Rwanda Education Commons— a one stop portal for education information.

By 2013, the One Laptop per Child Project was already implemented in 407 schools with 207,026 XO laptops, and 10,000 teachers have been trained with basic ICT skills (The New Times, 2013).

While the input measures for ICT policy implementation to support learning have been impressive, achieving the intended learning outcome goals requires changing the culture, beliefs and practices in schools. In a study of Rwandan teachers' perception of the OLPC project, Fajebe, Best and Smyth (2013) find that the project was primarily considered as a computer literacy and rote-learning project. Use of the XOs by students for self-directed, exploratory learning activities was rare. Teachers reported anecdotes that indicate some students were becoming less subservient and started challenging their teachers based on information found from the Internet. While a few teachers appreciate that students were becoming better, more autonomous learners, most viewed the laptops as a source of negative empowerment—causing students to become distracted, disruptive and disrespectful. Interestingly, they found that the teachers view themselves as the primary users and learners of the technology. In addition, teachers also found implementation of the OLPC program to bring about additional burdens. These findings provide evidence that the link between ICT in education and economic development is a nuanced one as it involves complex socio-technical changes in the implementation of this educational innovation.

Beyond 2015

Chile has a strong and persisting focus on ICT use in education starting from 1992. The policy is well rounded, encompassing all the key implementation areas: infrastructure, teacher training, digital educational resources and private sector involvement. The targeted learning outcomes presented in the policy (Chile MOE, 2013a) reflects a clear focus on 21st century skills needed for life and work in a knowledge society. The main challenges Chile faces, which are also encountered by many developed countries, are issues related to the second digital divide (Claro et al, 2012), i.e. students' ability to develop ICT competence as an integral component of 21st century skills being strongly influenced by their family background.

Rwanda is the classic case of using education development as one of its core policy leverage to advance the country into a knowledge society. It has done so very persistently throughout the past 13 years, paying great attention to ensuring policy alignment across different sectors of development. However, its focus on developing an ICT-led service industry faces huge challenges when the country has a weak agricultural base, very minimal manufacturing and service industries and a low literacy rate. Nevertheless it has achieved rapid growth economically as well as made advances in primary enrolment rate (99%). Primary education completion rate is only 58% in 2012. There is no strong focus on ICT use for adult education.

In China, there is a strong focus on ICT use to improve education opportunities for disadvantaged communities, via distance education models. It is beginning to expand the use of ICT as core delivery methods in distance education. Its Television Universities have recently been renamed Open Universities to reflect this change. China has also engaged in recent MOOC endeavors at the higher education arena. Unlike Rwanda, China has not made explicit references to the UNESCO (2008) framework in its ICT in education policy development, its first ICT in education development plan (PRC MOE, 2012) clearly indicates that the policy focus for implementing ICT in schools has moved beyond that of basic access to fostering creativity, problem solving and knowledge creation. Its successes in raising the

literacy level of the general population, and in particular the rural communities in the Western regions of the country, have laid good educational foundations for the development of more sophisticated ICT-related skills. The development of a strong industrial base, including that of computer and electronic industries, have also provided a good economic and infrastructure basis for more widespread and more sophisticated uses of technology for teaching and learning. On the other hand, whether the goals of the Country's *Education and Information Technology Ten-Year Development Plan 2011-2020* (PRC MOE, 2012) to foster national innovation capacity and supporting modernization is a new challenge to be addressed.

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