



THE INTEGRATION OF ICT INTO EDUCATION AND TRAINING SYSTEMS IN AFRICA



The Cases of

Argentina, Burkina
Faso, Côte d'Ivoire,
Paraguay, Senegal,
Tunisia, Uruguay

The Integration of ICT Into Education
and Training Systems in Africa

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Burkina Faso, Côte d'Ivoire,
Paraguay, Senegal, Tunisia and Uruguay

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Introduction

By Tarek Chehidi, Coordinator, ADEA Task Force on ICT

Today, interest in the potential of ICTs to transform learning experiences and outcomes in Africa usually translates into technological deployment. In most of the cases, it is the result of political will, while development and implementation of *ICT integration in education and training* policies are usually entrusted to technology experts.

ICT policies, or even projects, developed without strong involvement and leadership of educational actors mainly stress investment in technology and end up producing ill-informed implementation strategies leading to mismatch between technological deployment and the capacity of education and training systems to assimilate technology-driven innovation and update accordingly pedagogic practices.

The integration of ICTs in education and training has been, and still is, a challenge to many education and training systems. This is due to the fact that it seeks to get a very innovative and fast moving ICT sector, to contribute to the development of education and training systems, which are considered to be relatively conservative. Failure to effectively integrate ICT, drawing relevant conclusions and moving towards the development of better informed, education policy objectives-driven, policies and strategies are part of the learning process all education and training systems have gone through.

In the case of the African continent, it is important to note that major actors of the IT industry were not well established and represented.

This has inhibited interaction between the educational community and the IT industry, which is critical to the emergence of ecosystems that would help develop the knowledge, skills, environment and partnerships necessary for large-scale and relevant *ICT integration*. On the other side, research shows that there are nowadays a considerable number of initiatives to introduce ICTs in education and training systems in Africa. Today, there is a pool of African and international experts with enough knowledge of the issues in this field.

Today, enough knowledge and expertise are available in Africa and beyond the continent on how relevant and effective ICT integration in education and training policies were developed. Indeed, many of ADEA's partners have produced, contributed to or funded relevant research. This initiative intends to capitalize on existing research and other analytical work that have already been developed by partners and attempts to identify the approaches that have been adopted by several education and training systems in dealing with ICT integration and the lessons learned. The analytical work will also identify levers that catalyze ICT integration and look closely at factors driving or constraining it.

The studies included in this report are based on existing research and analytical work. Each study provides a very brief background and macro-level national information to allow readers to understand the challenges faced by the country's education system.

The studies address the following issues: ICT integration policy development and implementation; teachers' training; availability and development of relevant e-content; usage of ICT administration and management; and how ICT contributes to providing learning opportunities to marginalized groups (including girls, rural, handicapped, etc.).

They describe how these issues have been addressed and lessons learned, including the enabling environment and factors that constrain or promote ICT integration initiatives.

Argentina

The Integration of ICT in Argentina's Education System

by Diego Filmus

Published with support of the
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Education, Science and Culture (OEI)



1. Executive Summary

This paper presents the following regarding ICT Integration in Argentina's education system:

1. Background Information on the Republic of Argentina

With over 40.7 million inhabitants, Argentina is considered an upper-middle income country and one of South America's leaders in human development. The country experienced strong economic and social growth in the past decade after one of its worst ever economic and social crises during 1999-2002.

2. Educational Overview of Argentina

During the recovery and expansion of 2003-2013, Argentina also experienced an important resurgence and transformation of its educational system. These changes were consolidated in 2006, through the approval of a new National Education Law and a National Education Financing Law which guarantees a minimum education budget of 6% of the national GDP by 2010.

3. ICT Overview of Argentina

Since 2009, Argentina's ICT policies have been framed within a national coordination strategy called *Agenda Digital Argentina*. Highlighted among the policies, are e-government development, infrastructure deployment, and technological innovation, all of which are an integral part of consolidating Argentina's economic, social and educational progress while promoting digital inclusion. According to the United Nation's International Telecommunication Union (ITU), Argentina ranks third on the ICT Development Index in South America.

4. Analysis: Argentina's Education and ICT Integration Policies

With the above background and overview, this section presents two themes of analysis: ICT integration policy development and implementation, and the availability and development of relevant e-content. Concretely, three key policies are analyzed to demonstrate what has been accomplished, how and the lessons learned, including the enabling environment and factors that constrain or promote ICT integration initiatives:

- i. *Argentina Conectada* is a five-year strategic plan (2010-2015) that defines the telecommunications infrastructure and services policy. The plan integrates several ongoing programs aimed at digitizing terrestrial television broadcasting, providing ICT equipment and training to public school students, extending internet connectivity to remote areas, and establishing public access ICT centers. The strategic orientations of *Argentina Conectada* are digital inclusion; optimizing use of the radio-frequency spectrum; developing universal service; national production and creation of employment in the telecommunication sector; training and research in telecommunication technologies; infrastructure and connectivity; and capacity building.
- ii. *Agenda Digital Argentina* is also responsible for coordinating the integration of *Argentina Conectada* to *Televisión Digital Abierta (TDA)*, a ten-year plan launched in 2009 that seeks to ensure universal and free access to Digital Terrestrial and Satellite Television. TDA is charged with planning the transition from analogue to digital television in order to ensure a progressive and free adherence to all users; contributing to technological convergence; improving quality of audio, video and services; encouraging local industry in the production of digital tools and services; and promoting job creation and worker training in the technological industry.

- iii. *Educ.ar State Corporation* coordinates the national policy for integrating ICT into the education system, which since 2006 has been framed by the new National Education Law, requiring the incorporation of new technologies at all educational levels to improve teaching and learning processes of both students and teachers. The Law appoints *Educ.ar* to develop and implement these policies, create content on the education web portal (www.educ.ar), as well as to produce and broadcast audiovisual materials in the framework of national education policy.
- iv. *Conectar Igualdad* (Connect Equality) is Argentina's national 1-to-1 netbook policy that seeks to promote digital and educational inclusion at the public secondary education level. The initiative aims to reach the entire country, distributing 3.5 million netbooks between 2010 to 2013 to every student and teacher in public secondary schools, special education centers and teacher training institutes. Simultaneously, digital content is being developed in collaboration with *Educ.ar* for didactic purposes and teacher training processes are being improved to transform learning and teaching paradigms, models and processes. Internet access to schools is being coordinated with *Argentina Conectada*, ensuring optical fiber connection where possible, otherwise via satellite.

5. Argentina's Regional Integration and South-South Cooperation in ICT and Education

Argentina's commitment to ICT integration in education over the past decade has consolidated its status as a regional leader. Neighboring countries have also transited a period of economic and social growth, and to varying degrees, have undertaken similar policies to promote education and ICT integration.

In this context, the Organization of Ibero-American States for Education, Science and Culture (OEI) has contributed greatly to a growing regional cooperation framework in these themes. This increasing cooperation culminated in the creation of the *Ibero-Amer-*

ican Institute for ICT and Education (IBERTIC), an initiative headquartered in the OEI National Office in Argentina, destined to become a regional authority regarding all themes relating to ICT and education: www.ibertic.org.

1. Background Information on the Republic of Argentina¹

Argentina is located in South America, bordered by Bolivia and Paraguay to the north, Chile to the west and south, and Brazil, Uruguay, and the Atlantic Ocean to the east. Recognized as an upper middle income country and one of the regional leaders in human development, Argentina experienced strong economic and social growth in the past decade



after one of its worst ever economic and social crises during 1999-2002. From 2003 to date, GDP per capita has grown steadily, accumulating 63% growth. Also, a drop in the GINI rate marked a significant improvement in the distribution of wealth. This positive panorama is reinforced by a decreasing infant mortality rate and increasing life expectancy. Also, the population that does not have sufficient income to cover basic food and services declined sharply to 8.6%.

1. All of the data on this page is taken from: IIPE-OEI (2012), *Perfil Argentina*, Sistema de Información de Tendencias Educativas en América Latina (SITEAL), www.siteal.iipe-oei.org.

General Data		Development Data	
Land mass	3,761,364 km ² , eighth largest in the world	GDP (PPP) per capita	\$15,030 (2010)
Political System	Representative Federal Republic	GINI	0.51 (2010)
Administrative Political Divisions	23 Provinces, 512 Departments, 1,148 Municipalities	Human Development Index (HDI)	0.749 (2000)
Official Language	Spanish	HDI in the year 2000	0.797 (2011)
		HDI Global Position	45 (2011)
		HDI Regional Position	2 (2011)
		Unemployment Rate	7.2% (2011)
Demographic Data		Social Spending Data	
Total Population	40,738,000 (2010)	Total Social Spending as % of GDP	27,78% (2009)
Urban Population	93.1% (2010)	Total Education Spending as % of GDP	6,68% (2009)
Dependency Rate	55.2% (2010)	Total Health Spending as % of GDP	8,10% (2010)
Migration Rate	0.2% (2005-10)		
Fertility Rate	2.2% (2010-15)		
Life expectancy	76.2 yrs (2010-15)		

2. Educational Overview of Argentina²

During the recovery and expansion of 2003-2013, Argentina also experienced an important resurgence and transformation of its educational system. These changes were consolidated in 2006, through the approval of a new National Education Law and a National Education Financing Law. Through these laws, the state guarantees the financing of the national education system, ensuring that the consolidated budget of the national and provincial governments dedicated to education is no less than 6% of the GDP by 2010.

Compulsory education as per the Education Law stretches from the age of five until the completion of secondary level education, entailing a minimum of ten years of schooling.

Late enrollment

Compulsory school attendance as established by law indicates that at six years of age, all children should be attending the first grade of primary school. This objective has been essentially met with almost all 6 year olds attending school.

Early Schooling

Currently, about 94% of all 5 year olds comply with compulsory education and are enrolled in pre-primary schooling. This number increased significantly during the 2000-2011 period. However, the gap between social sectors remains wide. 76% of 5 year olds living in the most disadvantaged households are in school, while 97% among those from the highest social stratus are attending.

2. All of the data on this page is taken from: IIPE-OEI (2012), *Perfil Argentina*, Sistema de Información de Tendencias Educativas en América Latina (SITEAL), www.siteal.iipe-oei.org.

Access, repetition and graduation from primary education

In 2011, the net primary school enrollment rate reached 95%. The proportion of students who attended primary level aged two or more years higher than their grade level was at 7%, which implied a reduction of 2% compared to 2000. Also, the graduation rate for the primary level is 98%. That is, 98% of the youth aged 15 who enrolled at the primary level, completed it.

Access, repetition, and graduation from secondary education

In 2011, the net secondary enrollment rate reached 84%. This implies an expansion of about 3% for the 2000-2011 period. In 2011, 33% of the students who attended the secondary level were aged two years or older than their grade level. The graduation rate reached about 70% for the level. That is, 7 out of 10 aged between 20 and 22 years who were admitted to the secondary level, managed to finish it. Also, access to and the manner in which it is coursed, and then finished, depends closely upon one's social origins, a situation which has not been reversed during the 2000-2011 period.

Access and graduation of post-secondary education

In 2011, 32% of young people between 20 and 21 years old attended post-secondary education, while 63% of those aged between 30 and 33 who were admitted to post-secondary education managed to complete it. The social gaps are considerable regarding the access and graduation at this level.

3. ICT Overview of Argentina

Since 2009, Argentina's ICT policies have been framed within a national coordination strategy called *Agenda Digital Argentina (ADA)*. The ADA, directed by a multi-sectoral cabinet, is responsible for maximizing the opportunities offered by the information and knowledge society for the government, institutions and the people of Argentina. Through a collaborative, open, and permanent strategy, the ADA seeks to integrate the use of ICT to promote development and social inclusion by favoring locally produced goods and services.³

Agenda Digital Argentina brings together various ICT policies being carried out by the national government. Among those initiatives are e-government development, infrastructure deployment, digital inclusion and accessibility, and technological development, all of which are an integral part of consolidating the economic, social and educational recovery undertaken by the Argentine government since 2003.

According to the United Nation's International Telecommunication Union (ITU) *Measuring the Information Society 2012* report, Argentina ranks third in South America on the ICT Development Index (IDI):⁴

3. Agenda Digital Argentina (2012), *¿Qué es la Agenda Digital?*, <http://www.agendadigital.gob.ar/agenda-digital>.
4. International Telecommunication Union (2012), *Measuring the Information Society*, http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2012/MIS2012_without_Annex_4.pdf

Argentina	Global Rank	South America Rank	ICT Development Index (IDI) 2011			
TOTAL IDI	56	3	IDI Indicators			
1. Access	59	2	Fixed-telephone subscriptions	Mobile-cellular subscriptions	% of households with computer	% of households with Internet
			24.9%	134.9%	50%	38%
2. Use	60	4	% of individuals using the Internet (2011 data)	Fixed-broadband Internet subscriptions	Active mobile-broadband subscriptions	
			47.7%	10.5%	11.7%	
3. Skills	30	1	Secondary Gross Enrolment Ratio	Tertiary Gross Enrolment Ratio	Adult Literacy Rate	
			88.5%	71.2%	97.7%	

In May 2012, the ITU awarded the World Telecommunication and Information Society Award to the President of Argentina, Ms. Fernandez de Kirchner, declaring that “under President Kirchner’s able leadership, ICT development has made great strides in Argentina. The National Telecommunication Plan (*Argentina Conectada*), pushed by Executive Power through the Ministry of Federal Planning and Public Investment Services, has taken far-reaching steps in connecting the people of Argentina to ICTs. During President Kirchner’s first term in office, from 2007 to 2011, mobile connectivity in Argentina more than doubled from around 23 million to over 55 million mobile cellular subscriptions, giving a penetration rate of over 140%, compared with an average of 94.5% in the Americas region as a whole. The progress is even more striking when we learn that in 2003 there were fewer than 8 million mobile cellular subscriptions in the country.”⁵

5. International Telecommunication Union (2012), Speech by ITU Secretary-General, Dr Hamadoun I. Touré, World Telecommunication and Information Society Day, <http://www.itu.int/en/osg/speeches/Pages/2012-05-16.aspx>.

4. Analysis:

Argentina's Education and ICT Integration Policies

With the above background and overview, this section presents two themes of analysis: ICT integration policy development and implementation and the availability and development of relevant e-contents. Concretely, three key policies are analyzed to demonstrate what has been accomplished, how and the lessons learned, including the enabling environment and factors that constrain or promote ICT integration initiatives:

- i. National Telecommunications Plan: Argentina Conectada,
- ii. National program for integrating ICT into the education system: Educ.ar, and
- iii. National one-to-one netbook program: Conectar Igualdad.

i) National Telecommunications Plan: Argentina Conectada www.argentinaconectada.gob.ar

In October 2010 President Fernandez de Kirchner announced the National Telecommunications Plan: *Argentina Conectada*, under the guiding principle that all Argentines have the right to be informed, connected, and communicated via new technologies.

Argentina Conectada is a five-year strategic plan (2010-2015) that defines the telecommunications infrastructure and services policy for the national territory. The plan combines under a single connectivity initiative several other efforts already under way, the main thrust of which is public investment for the deployment of communications infrastructure, equipment and services. In particular, it integrates ongoing programs aimed at digitizing terrestrial television broadcasting, providing ICT equipment and training to pub-

lic-school students, extending connectivity to remote areas, and establishing public access ICT centers.⁶

The strategic orientations of *Argentina Conectada* are digital inclusion; optimizing use of the radio-frequency spectrum; developing universal service; national production and creation of employment in the telecommunication sector; training and research in telecommunication technologies; infrastructure and connectivity; and capacity building. In order to operationalize the plan, the government entrusted the development, implementation and operation of the federal optical fiber network to the *Empresa Argentina de Soluciones Satelitales SA* (AR-SAT), a government-owned corporation, declared as a public service provider.

Specifically, the plan entails the following objectives, timelines and sources of financing:⁷

Objective	Timeline	Financing
1. Core Optical Fiber Network coverage for 1.700 municipalities (will span over 50,000 kilometers)	2011-2012	National Government – AR-SAT
2. Coverage for 97% of the population through the integral implementation of the Federal Optical Fiber Network (satellite service for the remaining 3%)	2011-2015	National Government – AR-SAT
3. Improvement in the quality of broadband connections, establishing 10 Mbps as the quality standard for the new networks.	2011-2015	Development plans for state-of-the-art last-mile technology for local cooperatives and service providers. Telecommunication operators.

6. Argentina Conectada (2011), Planificación Estratégica: Plan Nacional de Telecomunicaciones Argentina Conectada, <http://www.argentinaconectada.gob.ar/adjuntos/139/documentos/000/011/0000011329.pdf>.

7. Argentina Conectada (2011).

Objective	Timeline	Financing
4. Broaden the connectivity of national, provincial and municipal government agencies.	Subject to schedule of the Federal Optical Fiber Network and provincial governments	National Government Provincial Governments
5. Provide connectivity to 100% of public schools	2011-2015	National Government <i>Conectar Igualdad</i> Program Universal Service Fund
6. Installation of 2,000 connectivity dishes for Satellite Internet Service (rural schools)	2011	National Government
7. Installation of 11,000 Digital Satellite Television for public establishments	2010-2012	National Communications Commission/ National Government
8. Establishment of 250 Knowledge Access Nucleuses (NAC)	2011-2015	Ministry of Federal Planning Communications Secretariat
9. Multiplication of Digital Access Points across the national territory (PAD)	2011-2015	Ministry of Federal Planning Communications Secretariat Telecommunications operators

As of June 2013, Government had laid out 9,290 miles of Core Optical Fiber Network and purchased another 4,409 kilometers of lines, and financed 2,550 kilometers of provincial networks that emerged from the backbone network and connected different rural locations.⁸ This effort has been complemented by the provision of satellite internet to 649 public schools in isolated, rural areas where the fiber network does not reach. A total of 2,348 dishes will be installed, providing internet to over 140,000 rural students.⁹

8. Argentin.ar (2013), *Argentina Conectada: Avanza el Plan Nacional de Telecomunicaciones*, <http://www.argentina.ar/temas/pais/19535-argentina-conectada-avanza-el-plan-nacional-de-telecomunicaciones>

9. Argentina Conectada (2012), *Argentina Conectada continúa brindando conectividad satelital a escuelas públicas de todo el país*, <http://www.argentinaconectada.gov.ar/notas/3484-argentina-conectada-continua-brindando-conectividad-satelital-escuelas-pblicas-todo-el-pas>

Agenda Digital Argentina (ADA) is also responsible for coordinating the integration of *Argentina Conectada* to *Televisión Digital Abierta* (TDA), a ten-year plan launched in 2009 that seeks to ensure universal and free access to Digital Terrestrial Television (DTT) and Digital Satellite Television (DST). TDA is charged with planning the transition from analogue to digital television in order to ensure a progressive and free adherence to all users; optimizing the use of the radio spectrum; contributing to technological convergence; improving quality of audio, video and services; encouraging local industry in the production of digital tools and services; and promoting job creation and worker training in the technological industry.

In order to promote quality, inclusive and civic oriented television, while guaranteeing a plurality of voices, this plan brings together a broad variety of actors to create the *Contenidos Digitales Abiertos* (CDA) platform to disseminate content of domestic audiovisual production in a dynamic and captivating format, while updating and implementing new technologies. CDA provides free Video On-Demand access to drama series, documentaries, movies, sports, special events and exclusive content, among others. The platform promotes the winning production of the TDA Promotion Plan (<http://fomento.tda.gob.ar>), available on the Argentine Bank for Universal Audiovisual Content (www.bacua.gob.ar), and from other actors in the audiovisual sector.¹⁰ CDA is now available on the following platforms: Web (www.cda.gob.ar), Smart TV and LG Blu Ray through its NetCast platform, Tablets and mobile phones with iOS (iPhone, iPad, iPod) and Android. The platform will soon be available on the TDA digital decoders currently in distribution.

In contrast to what has happened in most countries that have switched from analogue to digital television, in Argentina the technological leap began with the poorest households. By the end of 2012, 59 digital terrestrial stations were in operation across the country, covering 75% of the population, and during this year, these

10. Television Digital Abierta (2011), *Contenidos Digitales Abiertos (CDA)*, http://www.tda.gob.ar/contenidos/contenidos_digitales_abiertos.html

figures are expected to reach 86% coverage with 90 stations. The government has delivered 1,171,041 free digital television decoders in different parts of the country, while satellite digital television has been installed in 83 rural localities distributed across 16 provinces.¹¹

The above mentioned advances of *Argentina Conectada* have enabled and created synergies with various ICT education integration policies presented below.

ii. National program for integrating ICT into the education system: Educ.ar

Since 2006, the direction of Argentina's education ICT integration policy has been framed by the National Education Law, which requires the incorporation of new technologies at all educational levels to improve teaching and learning processes of both students and teachers. This process is highlighted in a special provision: "Access to and the mastery of information and communications technologies will be an integral component of the curriculum to promote inclusion in the knowledge society (Article 88)."¹²

The Law gives full authority and responsibility to the Ministry of Education to carry out policies to integrate the application and use of ICT in the field of education, and appoints Educ.ar State Corporation to develop and implement these policies, create content on the education web portal (www.educ.ar), as well as to produce and broadcast audiovisual materials in the framework of national education policy.

The Educ.ar State Corporation, the first institution of its kind on the Argentine Internet, was initially created in order to develop the

11. *Argentina.ar* (2012), *A fin de año el 86% de los hogares podrá captar la TV Digital*, <http://www.argentina.ar/temas/pais/1895-a-fin-de-ano-el-86-de-los-hogares-podra-captar-la-tv-digital>

12. *Ministerio de Educación* (2006), *Ley N° 26.206: Ley De Educación Nacional*, http://www.me.gov.ar/doc_pdf/ley_de_educ_nac.pdf

education portal in 2000, based upon a donation from the Martin Varsavsky Foundation to the national government. The project was launched in 2003 and after a thorough internal reorganization of the corporation a new profile has been defined for the portal. In 2013, the National Compulsory Education and Teacher Training Plan was launched, and Educ.ar jointly identified a number of specific goals for the next three years that framed the re-launch of its portal.¹³

1. A portal for everyone: teachers, families and students

Integrate the entire educational community, adding families and students as new recipients of content, services, spaces, and projects.

2. A collaborative portal: State content and users

Democratize spaces for the creation and distribution of materials and user-generated content to consolidate a dynamic portal oriented to the collaborative production of knowledge.

3. A social portal: the community creates and shares content

Create and disseminate the use of a national social network for a committed, restless and innovative educational community to promote a permanent exchange of knowledge and experience by recording and displaying collective intelligence on educational issues.

4. An up to date portal: continuous digital upgrade

Implement different content and training strategies for continuous updating on the world of knowledge and technology, to accompany educational actors in the dynamics of the knowledge society, ensuring the possibility of multifocal and flowing information and reflection.

5. An innovative portal: media, formats and languages

13. Educ.ar (2012), *Plan Nacional de Educación Obligatoria y Formación Docente*, <http://www.educ.ar/sitios/educar/noticias/ver?id=116592>

Work in a coordinated manner across the different professional teams of Educ.ar on media, formats and languages convergence strategies and projects, to redefine the portal as an educational multimedia with contents on various platforms (television, radio, Internet) and adaptable to divers devices (PC, phone, tablet), exploiting the educational possibilities of the new languages and promoting motivation, attraction and access of the user.

6. An integrated portal: national center for media production

Consolidate a portal integrated by a set of platforms on which content and projects articulated by the Ministry of National Education and the various production units of Educ.ar are displayed.

The first of various production units of Educ.ar is the *Encuentro* television channel, the first public educational network in Argentina. Initiated in 2005 by the Ministry of Education, the channel began its broadcasting in 2007. *Encuentro* is a federal television signal that produces content from every Argentine region and acquires prestigious productions from across Latin America and the world. It is a public communication service with no advertising. The signal reaches more than 6 million homes across the country, 24 hours a day, through a network of 1400 cable operators, as well as through slots in different channels and the national Public Television Channel 7.¹⁴ The *Encuentro* channel is complemented by an internet portal (www.encuentro.gov.ar) that links television with ICT to enhance both media and create a space of convergence.

The rapid success and critical acclaim of *Encuentro*, led to the creation of a second educational channel. *Pakapaka* (www.pakapaka.gov.ar), created in 2010, emerged from *Encuentro's* popular children's programming slot for ages 2 to 12. Today, *Pakapaka* is the first and only public education channel for children from Argentina and across Latin America. The channel is linked with other public institutions and public television stations across Latin America with

14. Encuentro (2013), *Acerca de*, <http://www.encuentro.gov.ar/sitios/encuentro/acercade/index>

proven experience in the field of children's audiovisual production. The content includes a variety of formats ranging from fiction, to 2D and 3D animation, documentary, and live filming.

The recently created Ministry for Science, Technology and Innovative Production, followed in the footsteps of the Ministry of Education, and in 2011, launched TecnoPolis TV (www.tectv.gob.ar). This public television channel aims to promote and disseminate the policies of the Ministry, through the creation of an open digital TV signal, as well as the coordination and development of programming and the promotion of content. Underpinning these objectives is the overarching vision of showing science as an activity that generates economic growth and can improve the quality of life for all citizens.

Content from *Encuentro*, *Pakapaka* and *TecnoPolis TV* can also be accessed through the consolidated Argentine Bank for Universal Audiovisual Content (www.bacua.gob.ar) and are all available on over one million of the digital decoders distributed through the *Televisión Digital Abierta (TDA)* program. Moreover, the above mentioned ICT policies have developed an enabling environment for Argentina's most ambitious and innovative initiative: the one-netbook-per-child program, *Conectar Igualdad*.

iii. National one-to-one netbook program: *Conectar Igualdad*.

Conectar Igualdad is Argentina's national 1-to-1 netbook policy that seeks to promote digital and educational inclusion at the public secondary education level. The Program was launched by the President Fernandez de Kirchner in 2010, and is implemented jointly by the President's Office, the Social Security Administration (ANSES), the Ministry of Education, the Ministers' Cabinet, and the Ministry of Federal Planning, Public Investment and Services.

Conectar Igualdad aims to reach the entire country, distributing 3.5 million netbooks between 2010 to 2013 to every student and teacher

in public secondary schools, special education centers and teacher training institutes. Simultaneously, digital content is being developed in collaboration with the Educ.ar State Corporation for didactic purposes and teacher training processes are being improved to transform learning and teaching paradigms, models and processes. Internet access to schools is being coordinated with the *Argentina Conectada* program, ensuring optical fiber connection where possible, otherwise via satellite.

The following table lists the general objectives of *Conectar Igualdad* and the criteria of analysis for the evaluation of the Program:¹⁵

General Objectives	Dimensions of Analysis and Policy Highlights
1. Guarantee access to ICT in the public education system	<ul style="list-style-type: none"> • Basic infrastructure (technological floor) and equipment (servers, cabling, access points) • Connectivity via <i>Argentina Conectada</i> • Distribution of netbooks to secondary schools, special education centers, teacher training institutes and mobile classrooms
2. Contribute to improving the quality of public education	<ul style="list-style-type: none"> • Access to online digital educational content via a desktop for students http://escritorioalumnos.educ.ar • Access to offline digital educational content via an Educ.ar CD: http://coleccion.educ.ar/index.html • Inclusion of ICT resources in teaching practices and student learning • Quality of learning and education trajectories • ICT abilities of students and teachers

15. Conectar Igualdad (2011), *Informe de alcances y resultados del Programa Conectar Igualdad*. Buenos Aires, Argentina.

3. Facilitate the educative and social integration of Special Education students	<ul style="list-style-type: none"> • Access to online digital educational content via a desktop for special education students: http://escritorioeducacionespecial.educ.ar • Inclusion of ICT resources in teaching practices and learning practices to improve the quality of learning • ICT abilities of students and teachers • Social integration of persons with different capacities • Strengthening the role of families in accompanying the schooling of students
4. Strengthen teacher training in the use of ICT	<ul style="list-style-type: none"> • Content, research and knowledge production, online resource desktop for teachers http://escritoriODOcentes.educ.ar • Inclusion of ICT resources in teaching practices and learning practices • Education trajectories • Online and offline continued teacher training: launch of post-graduate Specialization in Education and ICT: http://postitulo.educacion.gov.ar
5. Improve the management and administration of schools	<ul style="list-style-type: none"> • Administrative institutional management • Pedagogical institutional management • Management of the Program in the institution • Institutional communication management
6. ICT literacy for the entire population	<ul style="list-style-type: none"> • Access to online digital educational content via a desktop for families: http://escritoriofamilias.educ.ar • Homes with internet Access via <i>Argentina Conectada</i> • Social use of ICT among the general public, youth, students and teachers. • Development and use of social, educational, and community networks • Citizen training and the exercise of rights via the access to information • Promotion of the initiative via festivals for students, teachers and communities

7. Promote the national ICT industry	<ul style="list-style-type: none"> • Industrial development • Academic and scientific research • Legal framework • ICT development policies • Higher level training • In 2010, 100% of the netbooks were imported, and by 2013, the netbooks are made up of the following components produced or assembled 100% nationally: memories (assembled), power cables, battery chargers, cell batteries (assembled) and ISDB-T tuner cards (assembled)
8. Improve the implementation of public policies at the national level	<ul style="list-style-type: none"> • Legal framework of the Program • Management model of the Program • Interaction modalities • National and jurisdictional technical teams • Communication management • National and provincial planning

Since the inception of the program in April 2010 until July 2013, just over 3 million netbooks have been distributed.¹⁶ Almost 90% have been distributed to students and the remaining 10% to teachers, and having reached approximately 8,000 schools across the country, reaching the entire spectrum of regions and social sectors. These figures make *Conectar Igualdad* by far the largest program of its kind in the world. To compare, Venezuela has distributed over 2.4 million devices, Peru 800,000, Portugal 700,000 Brazil 600,000, while Uruguay has reached over 500,000 units.¹⁷

The evaluation and monitoring of *Conectar Igualdad* involve four lines of activities, coordinated by *educ.ar* and the Organization of Ibero-American States (OEI):

1. Follow-up and monitoring of schools to assess the use of netbooks and ICT and evaluate the impact of computers on teaching and learning

16. Conectar Igualdad (2013), *La Presidenta de la Nación, Cristina Fernández de Kirchner, entregó la netbook 3 millones*, <http://www.conectarigualdad.gob.ar/noticia/la-presidenta-de-la-nacin-cristina-fernandez-de-kirchner-entregl-la-netbook-millones-686>

17. RELPE (2013), *Relevamiento 1 a 1 en la región*, Documento no publicado.

2. Analysis by education experts on the *Conectar Igualdad* implementation
3. Promotion of research on *Conectar Igualdad* by university-based researchers

Installation of “model classrooms” equipped with 2.0 devices (smartboards, netbooks, servers, access to digital content) to assess the concrete elements that could facilitate teacher professional development.

The first preliminary evaluation of the program was conducted by a committee of 11 national universities, and was presented in late 2011 by the Minister of Education. According to the study, 85% of teachers and administrators and 78% of students felt that the initiative is fundamental for “reappraising the value of public schools”; 86% of adults and 85% of students said that the initiative contributes to “generating equality of opportunity among young people”; 80.5% of students said it “helps reduce educational differences” and 69.5% said it “motivated increased enrollment and reinsertion into schools.” Moreover, the 80.5% of the students surveyed said they use the computers the most during class as they find it more dynamic, fun and easier to learn this way. Finally, 81.6% of the students believe that they are now better able to manage the devices, thus they are better prepared for the workplace or tertiary education.¹⁸ In May of 2012, the Ministry of Education, ANSES, 15 national universities and the Organization of Ibero-American States signed an agreement to conduct the second stage of the program’s evaluation which is currently underway.

In 2011, Intel Corporation published a report to understand the successes, challenges, and policy implications of *Conectar Igualdad*. The information in this report is based on original data collection and analysis by researchers at the University of San Andrés in Bue-

18. Conectar Igualdad (2011), *Nuevas voces, nuevos escenarios: estudios evaluativos sobre el Programa Conectar Igualdad*, <http://repositorio.educacion.gov.ar:8080/dspace/bitstream/item/96909/Investigacion%20PCI.pdf?sequence=1>

nos Aires, Argentina, in collaboration with SRI International and Intel. The report concludes that the ongoing success of Argentina's education transformation depends on several best practices that other countries can follow to achieve similar success.¹⁹

Best Practice 1: Strong leadership supported by long-term funding. *Conectar Igualdad* is a federal initiative that has the full support of the president, and is being planned and implemented by several federal agencies. Such strong central leadership is essential, along with active engagement by local governments and school districts. The stable funding of the program through the national retirement and pension fund—which is providing USD 1.3 billion over three years—has also been essential to drive support for the program and alleviate concerns over sustainability.

Best Practice 2: Independent oversight. The Organization of Ibero-American States (OEI) provides oversight and transparency for Argentina's netbook purchase. To oversee the *Conectar Igualdad* program, an independent executive committee was established. The executive committee steers program strategy and execution as well as arbitrates among the multiple federal agencies and other stakeholders.

Best Practice 3: Early consideration of all components to transform education. Successful education transformations depend on five key components (discussed in greater detail on page 3 of the report). By focusing on each of these elements early in the planning process, *Conectar Igualdad* has been able to create a coordinated, holistic plan for program success. For instance, while netbooks are being distributed as part of the ICT component, 19,000 teachers have completed professional development courses to learn how to incorporate the new technology into their classrooms. At the same time, Educ.ar is distributing optimized digital curriculum through its net-

19. Intel (2011), *Pioneering Program Expands Education Opportunities Across Argentina*, http://download.intel.com/education/transformation/Ed_Transformation_CS_Argentina_LoRes.pdf

work of web portals, finalizing plans for the research and evaluation process.

A year later, Intel commissioned another study with the School of Education at the Universidad de San Andres to understand and analyze the initiative's vision, successes, and challenges and share them internationally. The main conclusions of the Intel report are:²⁰

- *Conectar Igualdad* shows the potential for national-level 1:1 eLearning programs to reduce the digital literacy gap, and ultimately promote economic development.
- Other countries can develop successful 1:1 eLearning programs that build on the challenges and successes identified in *Conectar Igualdad*.

20. Intel (2012), Research Shows Successes, Challenges of Argentina's Nationwide 1:1 eLearning Program <http://www.intel.com/content/dam/www/program/education/us/en/documents/Intel%20Education%20Research%20Summary/intel-education-research-summary-argentina-2012-eng-web.pdf>

5. Argentina's Regional Integration and South-South Cooperation in ICT and Education

Argentina's commitment to ICT integration in education over the past decade has consolidated its status as a regional leader. Neighboring countries have also transited a period of economic and social growth, and to varying degrees, have undertaken similar policies to promote education and ICT integration. In this context, the Organization of Ibero-American States for Education, Science and Culture (OEI) has contributed greatly to a growing regional cooperation framework in these themes.

Over the past decade, the OEI has developed a close relationship with Argentina's ICT education integration policies. In 2010, the OEI National Office in Buenos Aires was selected to administer and oversee *Conectar Igualdad's* fund, valued at over 2 billion dollars. This responsibility entailed the acquisition and distribution of the netbooks, co-developing content, conducting the country-wide teacher training course, and managing the evaluation and follow-up of the program. The lessons learned from this 1-to-1 experience are being passed onto neighboring countries via the OEI. Similarly, the digital content designed for the netbooks has been developed in collaboration with members of the Latin American Network of Education Portals (*RELPE*), in particular Argentina's portal, *Educ.ar*.

In 2011, the OEI was then selected by the Argentine Ministry of Federal Planning to collaborate closely with the Digital Inclusion component of the *Argentina Conectada* program. The OEI's responsibilities include providing the technical and administrative assistance

for the acquisition and installation of 150 Knowledge Access Nucleuses (NAC) and 150 Digital Access Points (PAD) across the country.

Given these and other similar experiences, the OEI has designated the national office in Argentina the responsibility to evaluate the regional progress regarding the ICT related educational goals, and to headquarter the *Ibero-American Institute for ICT and Education (IBERTIC)*, a regional initiative to promote and monitor all themes relating to ICT and education: www.ibertic.org.

IBERTIC aims to provide specialized technical assistance to Ibero-American countries through joint work with national authorities; public and private institutions; and networks of agencies, universities, and teachers for identifying, planning, training, and evaluating, among other activities that assist the effective application of ICT. Moreover, IBERTIC is working closely with OEI's Center for Higher University Studies (CAEU) and its important experience with virtual education and training courses, the Institute for Educational Development and Innovation (IDIE) and its development of indicator systems specialized in ICT, and various national one-to-one computing programs for students. Similarly, joint activities are being coordinated with the *Latin American Network of Education Portals (RELPE)*, *Virtual Educa* (a joint OAS-OEI project for promoting innovative projects in the fields of education and vocational training), and the *Ibero-American Educational Television (TEIB)*, who also serve on the Board of IBERTIC.

Led by the OEI Argentina National Office Director, IBERTIC is developing the following three main areas of activities: Research, Training and Evaluation, as well as a Dissemination and Knowledge Transfer Strategy.

RESEARCH

- i. Survey existing regional research with view of creating a space for promoting the production of knowledge on ICT and education.
- ii. Produce research in the area of ICT and education, specifically related to training and professional teacher development.
- iii. Develop a regional research project on Art, ICT and Education jointly with the Telefónica Foundation.

TRAINING

- i. Establish a training space that jointly articulates with the professional development activities of the Dissemination and Knowledge Transfer Strategy.
- ii. Organize, enrich and communicate an online training space.
- iii. Design and develop virtual and blended-education courses and training opportunities.
- iv. Design and develop technical references related to ICT education and training with possible scaling potential in the region.

EVALUATION

- i. Develop training and research support materials aimed specifically at evaluating the educational outcomes of digital integration and inclusion processes aimed at teachers, supervisors and managers, as well as national and local technical teams.
- ii. Construct a technical socio-educational assessment reference for evaluating digital inclusion programs and projects, both locally and nationally, ranging from design to implementation processes, monitoring, and evaluation activities in this area.
- iii. Establish an Ibero-American Observatory of digital inclusion policies in education.

The Dissemination and Knowledge Transfer strategy has already carried out more than twenty presentations ranging from conferences, expositions on the results of research studies, as well as

“Teachers for Teachers” workshops. All these presentations have been filmed and are available on: <http://www.oei.org.ar/ibertic/pasadas.php>.

A current project worth highlighting is *Alfabetica* (<http://alfabetica.educativa.org>), an initiative that works with initial youth and adult literacy processes by generating multimedia and interactive material available through multiple access points, especially netbooks and mobile devices. This project promotes the integration of social and community organizations, as well as family involvement in literacy empowerment processes. The project is applicable and adaptable to different countries according to their customs, practices and cultural particularities.

IBERTIC continues to carry out its activities in line with the instructions of the Ministers of Education at the XXI Ibero-American Education Conference in 2011, requesting that the “OEI take the necessary measures to establish alliances with extra-regional countries and organizations, public and private enterprises, civil society organizations... as well as articulating the efforts of international development cooperation with a view to complying with the 2021 Educational Goals.”²¹ In this context, at the same Conference, the OEI signed a Memorandum of Understanding with ADEA in order to promote cooperation, and in 2012, IBERTIC joined the ADEA Task Force on ICT. This paper has been completed as part of IBERTIC’s role on the Task Force, along with two other country studies on Paraguay and Uruguay.

21. OEI (2011), *XXI Conferencia Iberoamericana de Educación Asunción, Declaración de la XXI Conferencia Iberoamericana de Educación, Paraguay, 26 de septiembre de 2011*, <http://www.oei.es/cie21.php>

Burkina Faso

The Integration of ICT in Education and Training in Burkina Faso

by Boureima Claude Dalla

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Executive Summary

The cardinal tasks of any education and research system are founded on teaching, education and training. The aim must be to educate learners to make citizens of them, to train them for a career and to provide them with a culture that is relevant and useful to life in society. Teaching in the end cannot be seen as other than in combination with the research to deepen and renew knowledge in every sphere of activity.

In the context of Burkina, the education system is faced with numerous challenges, in particular those relating to the Millennium Development Goals (MDG) in which it is a major factor.

The concept of ICT integration into the education system covers the whole range of activities of the education and research system carried on with the intermediation of electronic resources.

In accordance with Burkina Faso's strategy of operationalization of the development plan for the national information and communication infrastructure (the "NICI" plan), the massive effort made by the Burkina Faso government and its partners to promote ICT use is aimed at a major objective, the building of an information society capable of boosting the indicators of development.

In order to reach this whole multidisciplinary dimension, a number of initiatives on ICT use in teaching/learning and training have been concretized in Burkina Faso.

For several years now, in the face of all the difficulties in implementation and continuation, ICT projects of several different technical types have been set in train in primary, post-primary, secondary and higher education.

And indeed the execution of those projects and initiatives has increased the level of access and use of the tools in the educational process, although the realities on the ground are variable.

We have thus seen and experienced the implementation of certain programs such as RESAFAD, which initiated a common impetus at all three levels in the education system.

No overview of the current situation of this kind can cover the whole range of projects, the implementation of each one of which has narrowed the digital gap even if certain social categories remain disadvantaged to a degree. The use of the various computer tools, infrastructures and networks by teachers and pupils has had an impact on consciousness and awareness, and perhaps even advocacy to our authorities when decisions are taken. But much remains to be done in terms of policy orientation and planning.

The e-education cyberstrategy, the largest body of reference criteria in terms of ICT in our country, has as its main goal not only to put information and communication technology (ICT) to use in carrying out the missions of the education and research system, but also to capitalize on good practice in order to resolve the basic issue of how to make ICT an integral part of education and training systems. At the same time it will resolve the problem of the political and institutional involvement of those who govern us.

Interest in the prospects defined at the end of this document is shared at every level of participation and decision-making in order to move towards to a single vision, the “relevant and effective integration of ICT into the education and training systems” for the benefit of all social categories in our population – and surely that is the wish of ADEA?

Acronyms and Abbreviations

AfDB	African Development Bank
ANPTIC	<i>Agence Nationale pour la Promotion des TIC / National Agency for the Promotion of Information and Communication Technology</i>
ARCEP	<i>Autorité de Régulation de Communications Électroniques et des Postes / Regulatory authority for electronic and postal communications</i>
AUF	<i>Association des universités francophones / Association of French-speaking universities</i>
AVU	<i>Université Virtuelle Africaine / African Virtual University</i>
CAMES	<i>Conseil africain et malgache pour l'enseignement supérieur / African and Malagasy Council for Higher Education</i>
CEDO	<i>Centre d'enseignement à distance de Ouagadougou / Ouagadougou Distance Teaching Centre</i>
CIL	<i>Commission informatique et liberté / Commission for information technology and liberty</i>
CNRST	<i>Centre national de la recherche scientifique et technologique / National center for scientific and technology research</i>
COCKTAIL	(Software package for the management of higher education institutions)
COSE-LEARN	Swiss cooperation in eLearning
CRDI	<i>Centre pour la recherche et le développement international / Centre for international research and development</i>
DAD	Archive and documentation directorate (MEBA)
DELGI	<i>Délégation générale à l'informatique / General delegation for information technology</i>
DGIFPE	<i>Direction Générale des Inspections et de la Formation du Personnel Enseignant / General directorate for Inspections and Teacher Training</i>

DPNTIC	<i>Direction de la promotion des NTIC / NICT promotion</i> directorate (UO)
DPTIC	<i>Direction de la promotion des TIC / ICT promotion</i> directorate (CNRST, UPB et UK)
ECA	Economic Commission for Africa
ENAREF	École nationale de régies financières / National school for financial departments
ENEP	Écoles Nationales des Enseignants du Primaire / National primary teacher training schools
ESTA	École supérieure des techniques avancées / Higher school for advanced technology
FONER	<i>Fonds national pour l'éducation et la recherche / National</i> fund for education and research
GESCO	<i>Gestion des élèves et suivi des activités pédagogiques /</i> Management of pupils and teaching activities
GIFF	<i>Gestion Informatisée du FONER / Computerized manage-</i> ment for FONER
ICT	Information and Communication Technology
ICTE	Information and Communication Technology for Educa- tion
IDB	Interactive Digital Blackboard
IDS	<i>Institut des sciences / Institute of Sciences</i>
IICD	International Institute for Communication and Develop- ment
ISP	Internet Service Provider
MDG	Millennium Development Goals
MEBA	<i>Ministère de l'enseignement de base et de l'alphabétisation</i> / Ministry of Basic Education and Literacy
MENA	<i>Ministère de l'Éducation Nationale et de l'alphabétisation /</i> Ministry of National Education and Literacy
MESSRS	<i>Ministères des enseignements secondaire, supérieur et</i> <i>de la recherche scientifique / Ministries of secondary and</i> higher education and scientific research
MHO	(Dutch cooperation program for the development of high- er education)
MJE	<i>Ministère de la jeunesse et de l'emploi / Ministry for youth</i> and employment

MPDEN	<i>Ministère des Postes et du Développement de l'Économie Numérique / Ministry of Development of the Digital Economy and Post</i>
MPTIC	<i>Ministère des postes et des Technologies de l'Information et de la Communication / Ministry of Post and Information and Communication Technologies</i>
MTPEN	<i>Ministère des Transports, des Postes et de l'Économie Numérique / Ministry of Transportation, Post and Digital Economy</i>
NGO	Non-Governmental Organization
NICI	National Information and Communication Infrastructure
NICT	<i>Nouvelles technologies de l'information et de la communication / New Information and Communication Technology</i>
OCECOS	<i>Office central des examens et concours du secondaire / Central office for examinations and competitive examinations in secondary education</i>
ONATEL	<i>Office Nationale des Télécommunications / National Office of Telecommunications</i>
PDDEB	<i>Plan décennal de développement de l'éducation de base / Ten-year Basic Education Development Plan</i>
PDESS	<i>Programme décennal de développement des enseignements secondaire et supérieur / Ten-year Development Plan for Secondary and Higher Education</i>
PDSEB	<i>Plan de Développement Stratégique de l'Éducation de Base / Strategic Development Plan for Basic Education</i>
PEPP	<i>Projet d'enseignement post-primaire / Post-primary education project</i>
PIL	Partner in learning
PMB	(documentation and library management software)
PN/EFTP	<i>Politique nationale de l'enseignement et de la formation techniques et professionnelles / National policy for technical and vocational education and training</i>
PPIE-VIH/ SIDA and NTIC	Integrated pilot program for Education, HIV/AIDS and NICT
RENER	<i>Réseau national pour l'éducation et la recherche / National education and research network</i>

RESAFAD	<i>Réseau africain de formation à distance</i> / African distance training network
RESINA	<i>Réseau intégré de l'administration</i> / Integrated administration network
SAREC	Swedish Agency for Research in Cooperation
SBA	Skills-Based Approach
SCOLARIX	(academic and school management software)
SDI	<i>Schéma Directeur Informatique</i> / IT master plan
SIGASPE	<i>Système Intégré de Gestion Administrative et Salariale du personnel de l'État</i> / Integrated system for the management of administration and pay for government employees
SOMI	<i>Service orientation et méthodes informatiques</i> / Department for information technology policy orientation and methods
SPONG	<i>Secrétariat permanent des ONG</i> / Permanent secretariat for NGOs
STATEDUC	(Education statistics management software)
SWOT	Strengths – Weaknesses – Opportunities – Threats
UK	University of Koudougou
UNEEPL	<i>Union nationale des Établissements d'Enseignement Privé et Laïques</i> / National union of private and secular teaching establishments
UNFM	<i>Université Numérique Francophone Mondiale</i> / World French-speaking Digital University
UO	University of Ouagadougou
UPB	<i>Université Polytechnique de Bobo Dioulasso</i> / Bobo Dioulasso Polytechnic University
VSAT	Very Small Aperture Terminal
WIN ISIS	(documentation and library management software)

1. Methodology

The aim of this study is to provide an overview of the current situation with respect to Information and Communication Technology for Education (ICTE) in the education system of Burkina Faso in terms of quality, relevance and effectiveness.

The methodology defined for the execution of the present study combines a number of different techniques: documentary research, interviews with program managers and actors, and personal experience.

Documentary research

This was carried out in official organizations, NGOs and non-profit associations involved in ICT integration in education in Burkina Faso: DNPTIC at the University of Ouagadougou, DEP at the Ministry of National Education and Literacy (MENA) and the Ministry of Secondary and Higher Education (MESS), and ARCEP. In addition, this research was done with non-profit associations and NGOs implementing ICT promotion programs and even activities oriented toward ICT integration in education and literacy or experimenting with pedagogical and/or educational innovations (AJSB, the TIC-EDUC-BF group). The aim was to gather a number of documents on various completed or ongoing programs:

- Study reports,
- Activity reports,
- Reference criteria.

This initial stage provided a picture of the various programs chosen for inclusion in the present study.

Information gathering

This process took several days and involved interviews with managers and/or actors in certain programs to gain a deeper knowledge of those programs (objectives, strategies, achievements), their difficulties and their vision of basic education combining quality, effectiveness and relevance.

Encounters

These meetings were conducted following a calendar defined for a small number of encounters for discussion with certain groups of stakeholders. They provided an opportunity to agree on the aspects to be addressed in relation to the focuses of the study. They were also occasions on which the information already gathered could be pooled.

2. Introduction

Conducting a “Survey of the current situation regarding ICT in education in Burkina Faso” is challenging in itself for at least two reasons.

Firstly, the feeling, or at least the impression, that everything has been tried to develop education in all our countries in the era of information and communication technology. Secondly, the bitter observation that for all the years during which ICT has been spoken of as a means of improving the quality of education we still do not appear to be seeing the end of the tunnel, so inferior are the results actually achieved to even the least optimistic of the forecasts.

Given this context, is it reasonable to expect that a solution can be found through our study and provide a response to the challenges involved in combating the “digital divide in education” endemic in virtually the whole of the African sub-region?

Such is not, we feel, the expectation of the Association for the Development of Education in Africa (ADEA) when it asks for a survey of the current situation regarding the integration of ICT in education and training systems.

We shall simply, when looking at the case of Burkina Faso, carry out a non-exhaustive survey of the possibilités open to our country in the this area based on more or less successful experiments, a small number of initiatives that have been abandoned and then taken up again in other forms, in order to arrive at the fundamental question of what should be retained in order to overcome finally the challenge posed by the integration of ICT into education and training systems.

Today more than ever “the question is no longer whether or not ICT should be used in education in Africa, but rather the choice of how

ICT should be used, ensuring fair access to teachers and learners, girls and boys, in rural areas and in urban centers.”

In the educational sphere there should be no expectation of rapid responses and solutions because many of the problems encountered usually require a strategy for action that is patient, concerted and negotiated – especially when what is needed is far-reaching reform.

We shall carry out our task on the basis of the framework submitted to us in order to offer an idea of ICTE in Burkina Faso’s education system, based not only on documentary research, but also on interviews and the results of certain experiments conducted by our ministries with responsibility for education, in addition to non-profit associations and NGOs active in ICT.

3. A Description of the Education System

The structure and organization of Burkina Faso's education system

Burkina Faso's education system began a major transformation in 2007 with the passing of the Education Orientation Law and the implementation of Education System Reform in 2007.

Under the terms of the Education Orientation Law, the country's education system is organized into categories: formal, non-formal, informal and specialized education.

Formal Education

This covers:

- Formal Basic Education comprising preschool education (children aged 3 to 5, duration 3 years), primary education (children aged 6 to 11, 6 years' schooling) and post-primary education (adolescents aged 12 to 16, 4 years' schooling); the "primary" and "post-primary" levels together form mandatory basic schooling.
- Secondary education: this takes children leaving the basic education level and has a single cycle with a final examination at its end which, if passed, leads to the award of a diploma or a certificate of qualification for access to higher education or employment. It includes i) General secondary education, ii) Technical and Vocational secondary education and iii) Artistic secondary education.
- Higher education is open to holders of the diplomas or qualification certificates awarded on completion of studies at sec-

ondary level. It includes: universities, higher institutes and the *Grandes Écoles*. It is structured in two or three cycles according to the type of education or training.

- Vocational and technical training aims to enable acquisition of specific knowledge and skills for a defined career or to improve a worker's productivity. It is dispensed by i) public- and private-sector schools and specialist facilities, ii) vocational training centers, iii) technical and vocational secondary education establishments in the public or private sector, and iv) technical and vocational higher education establishments.

Non-formal education

This covers:

- Non-formal education for young people and adults aged over 15: it is intended for young people and adults of both sexes aged over 15 years who are not in school or have left school but who wish to receive a specific type of training, with the following objectives: i) contribution to the elimination of illiteracy employing a range of formulas for achieving literacy, ii) provision of specific training, iii) encouragement of discussion of development issues, iv) support for research and experimentation efforts for the development of communities.
- Non-formal education for adolescents aged 9 to 15 is intended for adolescents of both sexes aged 9 to 15 who are not in school or have left school with the following objectives adopted in the Council of Ministers on 1 August 2012: i) a contribution to the expansion of the educational offering and the combat against illiteracy through the diversification of approaches to the promotion of literacy in national languages and French, ii) a contribution to the preservation of cultural values, iii) provision to learners of knowledge and skills of use in their daily lives and socio-professional integration, and iv) encouragement of the emergence of educational spaces conducive to the development

of technological innovations and the establishment of bridges between the formal and non-formal sectors of learning.

- Non-formal education in early childhood is intended for children aged 0 to 6 and its objective is to contribute to the socialization of young children and the development of their cognitive, psychomotor and socioaffective potential.
- Informal education and specialized education are also part of this mix.

The institutional framework for the management of Burkina Faso's education system

Over the period from independence to the present day the education sector in Burkina Faso has seen successive sectoral divisions and ministerial portfolios.

Since 2011, responsibility for the management of the education and training sector has been entrusted to four ministerial departments:

- The Ministry of National Education and Literacy (MENA), with oversight of basic and non-formal education,
- The Ministry of Secondary and Higher Education (MESS), with oversight of generalist and technical secondary education and higher education,
- The Ministry of Social Action and National Solidarity (MASSN), with responsibility for education in early childhood, preschool education and non-formal education in early childhood,
- The Ministry for Youth, Vocational Training and Employment (MJFPE), which deals with vocational training and apprenticeships, in addition to youth education.

The above four ministries cover every level of education from pre-school to higher along with the formal, non-formal and informal forms of education and training.

4. The Education System's Principal Indicators and Challenges

The poverty threshold in Burkina Faso is estimated at 43.9% for 2011 and the 5-24 age range accounts for 48% of total population. This figure is likely to rise to 50% by 2021. With the population growing by approximately 500,000 every year, the rate of expansion of the country's population, according to Jean Pierre Guingant, "... is without precedent in the history of any human population (with the exception of cases of massive immigration). It is the consequence of a very rapid decline in mortality and the maintenance of high levels of fertility over an exceptionally long period¹." In order to improve the population's living standards and conditions, the government has defined and implemented the Strategy for Accelerated Growth and Sustainable Development (SCADD) since 2010, the first phase of which relates to the period 2011 – 2015.

At primary level, thanks to the PDDEB, the number of schools rose from 5,389 in 2001 to 11,545 in 2011. In 2012-2013 the Gross Admission Rate (GAR) also rose (92.8%) compared with 2011-2012 (88.3%).

The Gross Enrolment Rate (GER) went from 79.6% to 81.3% over the period from 2011-2012 to 2012-2013, a rise of 1.7 percentage points. The rise was greater for girls than for boys (2.9 and 0.5 points respectively).

The Primary Completion Rate (PCR) went up by 4.4 points from 55.1% in 2011-2012 to 59.5% in 2012-2013.

1. Jean Pierre Guingant *et al.* P.7 : Comment bénéficier du dividende démographique ? [How to get the benefit of the demographic dividend?] Country Analysis, Burkina Faso, AFD, 2011

At post-primary level, the indicators also improved, although a great deal remains to be done compared with primary education. For example, in 2010, the rate of admission – 32.6% - is still low. Dropouts are also numerous and the enrolment rate is no more than 32.3% with a completion rate of 17.5%.

With regard to literacy and non-formal education for adolescents and young people, major progress has been achieved but the ineffectiveness of the formal system in raising literacy levels for all leavers, combined with the limited allocation of resources, mean that literacy levels remain at levels lower than planned. With regard to vocational training, very few young people gain access to this, the figure being below 20% for those in 15 -24 age range arriving every year on the labor market.

In order to meet the challenges described, the new program, entitled Program for the Strategic Development of Basic Education (PD-SEB, 2011-2015) has been designed with the goal of improving the indicators, notably for access, quality and management. It takes into account the options already defined in the various policies, strategies and programs for which the target audience is in the basic education category.

The following are the main policies and programs: the National Employment Policy (PNE 2006), the National Policy for Technical and Vocational Education and Training (EFTP) (PN-EFTP 2008), the National Policy for Secondary and Higher Education and Scientific Research (PN-ESSRS 2010), the National Program for the Acceleration of Literacy (PRONAA 2011-2015), the Strategic Capacity Reinforcement Plan (PSRC 2011) and the National Strategy for the Acceleration of Girls' Education (SNAEF 2011), among others.

The vision underpinning PDSEB is to contribute to “*educating citizens who are responsible, creative, productive, possessing universal values and equipped with the necessary skills to support the economic and social development of the country*” in accordance with

the goals assigned to the education system by the Education Orientation Law of July 2007².

Diagnostic analysis by the Ministry of Secondary and Higher Education and Scientific Research has highlighted a number of major issues and challenges to be considered when defining and implementing policy for the sub-sector. There is a need, among other things, to expand the educational offering while at the same time maintaining quality, to integrate ICT into the education system, to adjust the management of the system to adapt it to the decentralisation process and to complete curriculum reform successfully, applying a Skills-based Approach and introducing the BMD system. This will make it possible to put effective flow regulation mechanisms in place by developing bridges between the formal and non-formal sectors, between generalist education and technical education and vocational training.

2. Final document for the Strategic Plan for the Development of Basic Education, adopted in the Council of Ministers on 1 August 2012.

5. The Position of ICT in Burkina Faso

Indicators for ICT, the digital economy, the social and communication practices of young people and teachers, etc.

As high-potential sectors in the economic and social development of nations, information and communication technology (ICT) and postal services are at the present time a strategic tool for good governance, development and adding value to human resources.

In dedicating a ministerial department to the digital economy, the leaders of our country have laid out a path to the information society that will enable ICT and the postal sector to play to the full their role in accelerating national emergence in an increasingly digital world.

With regard to the issue of management and regulation, the Ministry of Development of the Digital Economy and Post (MDENP) is responsible for the administrative management aspect. It is supported at the technical level by bodies such as the Regulatory Authority for Electronic and Postal Communications (ARCEP), the Commission for Information Technology and Liberty (CIL) and the National Agency for the Promotion of ICT (ANPTIC).

ICT indicators relate to ICT access, use and skills, as well as the number of households with a computer, the number of Internet users and literacy rates.

Burkina Faso has three operators of electronic communication networks available to the general public: ONATEL and its mobile network, Airtel Burkina and Telecel Faso. These three serve a total subscriber base of 9,976,105, which gives a mobile telephony densi-

ty of 59.45 telephones for every 100 inhabitants as of 31 December 20123.

Continuous “low bandwidth” connections cover 52.32% of the population, there being a sharp disparity between urban and rural areas. This situation is proof that broadband Internet access is not always available to the population.

The following table summarizes the Internet subscriber base as of 31 December 2012

Operators	Subscriber base 2011	Subscriber base 2012
ONATEL mobile	2,941	75,000
Airtel	199,307	458,085
Telecel	106,278	61,413
Total	308,526	594,498

Internet Service Providers (ISP)

In 2012, the Regulatory Authority registered three (03) new Internet Service Providers. As of 31 December 2012, forty-three (43) Internet Service Providers (ISPs) were declared on the Internet market. However, only Fasonet, Connecteo, IPSYS and Alink are active in this market with the access speeds offered, which range between 128 kbps and 2 Mbps in dedicated or shared mode.

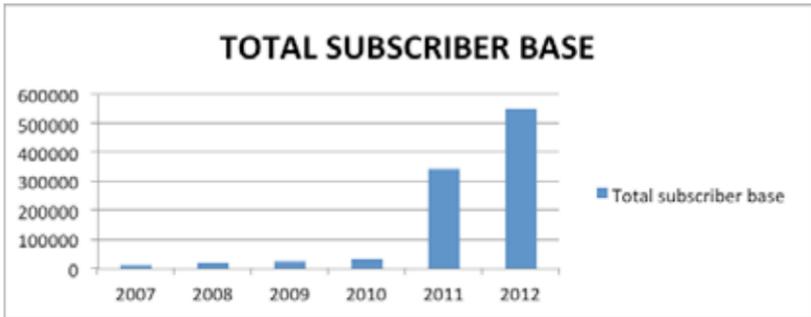
The Internet market as a whole

The following table summarizes the development of numbers of subscribers in Burkina Faso from 2007 to 2012.

Data/period	2007	2008	2009	2010	2011	2012
Mobile operators	-	-	-	-	308,526	594,498
ONATEL	12,103	19,684	23,364	28,741	31,186	30,030

3. Report by Burkina Faso's National Institute for Statistics and Demography (INSD), 2012.

Data/period	2007	2008	2009	2010	2011	2012
Other ISPs	-	-	-	-	313	469
Total subscriber base	12,103	19,684	23,364	28,741	340,025	549,997
Overall Annual Net Growth (numbers)		7,851	3,680	5,377	311,284	209,972
Overall Growth (Percentage)		62.63%	18.69%	23.01%	1,083.06%	61.75%



Where social practices are concerned, it must be realized that it is difficult to estimate ICT use by population groups in Burkina Faso. ICT use is particularly visible in most cases in Internet cafés by young people in accordance with the nature of the work-related activities of the individuals involved. In fact, access, relations and use vary from individual to individual.

Difficulties in accessing ICT tools and the Internet involve teachers and young people in informal types of use. They thus engage in social networks (Facebook, Twoo, Twitter, Badoo, etc.) using Internet cafés and smartphones, a phenomenon currently becoming increasingly widespread. Much used by young people and women (across all professions), these networks are employed as communication channels, serving work-related collaboration and the establishment of interpersonal relationships.

Today, certain relevant news publications on line direct readers to specific headings for Internet users.

It is worth noting that this type of use continues to be uncontrolled by the regulatory departments for ICT and digital communication.

6. Curricula and ICT

The policies on curricula are set out in the Education Orientation Law of 2007 (Articles 9, 10 and 13) and in the letter on education policy of 2013. Their goals are to make the young citizens of Burkina Faso responsible, productive and creative. They are aimed essentially at ensuring holistic and harmonious development of the individual and the promotion of a number of universal values such as solidarity, integrity, equity, justice, loyalty, tolerance and peace.

These teaching and learning processes are conducted in French (the official language of Burkina Faso) in primary, post-primary and secondary schools and in higher education. In satellite schools, bilingual schools and non-formal basic education centers teaching and learning take place in certain national languages (Moore, Dioula, Fulfulde, Gulmancema, Lobiri, Dagara, Cerma, Lyele, and Nuni).

Burkina Faso is beginning a reform of its curricula following a Skills-based Approach.

What is the role of ICT in the ways knowledge is transmitted?

As a taught subject, it should be noted that in Burkina Faso, ICT is not officially a part of teaching programs as a subject to be taught. This situation can be seen at all primary to secondary levels. Nevertheless, technical teaching establishments and some private establishments include among their objectives the teaching of the basics of IT and other technological tools in their programs.

As a teaching medium, in some secondary-level establishments, due to the personal motivation of certain teachers, it is possible to come across the use of ICT tools and software (e.g. video projectors, PowerPoint software) to facilitate the transmission of knowledge. This is nonexistent at primary level at the present time.

Training units exist in universities. It should also be noted at this level that the use of video projectors and interactive digital blackboards (IDBs) for classroom presentations is beginning to be part of usual practice for some teachers. Similarly, the implementation of the BMD system imposes the horizontal acquisition of ICT skills by all students.

Other initiatives for ICT use may also be encountered as a teaching subject or a teaching medium in private establishments but without these being included in their official teaching programs.

7. ICT in School Management and Administration – an Example

At the primary level, central and devolved administrative departments, like all other administrative organizations, use IT systems to manage the education system as a whole.

Certain directorates at the central administration level have RESINA optical fiber connections. For specific areas of management they each use software to match their core activities. The most important are listed in the following table.

Table summarizing the position for a small number of software programs and applications in government administration

ORGANIZATION	SPECIFIC APPLICATIONS	OPTIONS	FUNCTIONALITIES	OPERATING SYSTEM
DEP	StatEduc2	2/3rds oriented web	Entry and processing of statistical data on Basic Education	Microsoft Windows Microsoft Office 2003/2007 Arc view, SPSS, EduStat
Human Resources Directorate	SIGASPE	Network oriented	Administration and payroll management for government staff	Microsoft Windows Microsoft Office 2003/2007
Directorate of Administration and Finance	Computerized Expenditure Pathway (CID)	Network oriented	Processing and monitoring budget and expenditure authorizations	Microsoft Windows Microsoft Office 2003/2007

DEC	Integrated management of school examinations and competitive examinations (GICES)	Network oriented	Entry and management of marks in school examinations and competitive examinations	Microsoft Windows Microsoft Office 2003/2007
DG/AENF	Key Man National language transcription application	Stand-alone PC	Entry and transcription into national languages	Microsoft Windows Microsoft Office 2003/2007

At the devolved level, regional and provincial directorates and local districts use ICT tools (computers, software, and applications) to manage human resources and examinations in conjunction with the Human Resources Department and the Directorate for Examinations and Competitive Examinations.

As for private schools, some have IT equipment to manage human resources and pupils' school reports.

The six National Schools for Primary Teachers – Loumbila, Fada N' Gourma, Ouahigouya, Bobo-Dioulasso, Gaoua, and Dori – are also connected via RESINA and use certain software programs to manage staff and student teachers.

At post-primary and secondary levels central directorates use certain software programs and applications to manage staff, wages and statistics along with other academic management activities.

Some software tools and applications used in school administration

Office software and general tools	Communication tools	Tools for cooperative working, decision aids and archiving	Specific management tools
<ul style="list-style-type: none"> • Word processors, • Spreadsheets, • Presentation software, • Quark Xpress, • SPSS (planning), • Photoshop, • SONFORG, • AutoCAD. 	<ul style="list-style-type: none"> • Email, • Website, • VOIP (Skype, MSN, etc.). 	<ul style="list-style-type: none"> • WIN/ISIS (records management), • Shared diaries, • Email distribution groups, • Outlook. 	<ul style="list-style-type: none"> • Grant management software, • GIFF (Computerized management tool for FONER), • Inventory management, • Management of examinations and competitive examinations (Sage program by OCECOS), • Management of statistics, • GESCO (Management of pupils and teaching activities), • Management of student marks.

It is rare to find any establishment that makes learning software or educational programs available to pupils.

Software such as Ben Scolarité or Easy School (a software program) which facilitate modern, effective management of school day-to-day activities are also available but insufficiently used. Establishments use this technology to track the school activities of the children.

Administration is quite different in higher education. Their autonomy in infrastructure management provides a number of possibilities for innovation.

University administration uses software for the effective management of the following:

- Student registration,
- The BMD (Bachelor-Masters-Doctorate) system,

- Management of teaching staff and numbers of students.

Specifically, an adapted version of the Scholarix program, one of the modules of the Cocktail software package, is currently being deployed for the management of the BMD system.

8. The Current Status of ICTE

National policy description, quantities, tools, strengths and weaknesses

The introduction of IT, and more generally Information and Communication Technology (ICT), in the education system of Burkina Faso has been a concern of the country's authorities from very early on, and since 1985 they have been endeavoring to find ways and means to achieve this integration, developing initiatives to promote it, with the support of certain development partners.

Several opportunities have grasped and initiatives undertaken, and these have yielded results despite the numerous difficulties that had to be overcome, step by step.

Some experiments and initiatives at primary education level

- The African distance learning network (RESAFAD).
- *The portal website for national primary teacher training schools*: this portal website supplements the resource centers in order to meet requirements for ICT use in the initial and further training opened up for distance and classroom teaching.
- *The Technology Watch Center*: this facility was set up in 2001 in the Directorate for Pedagogical Research and Development (DRDP) in order to allow those involved in basic education to put their work on line and browse the Internet for documentary resources on teaching-related matters.
- E-classes for the integrated pilot program for Education, HIV/AIDS and NICT (PPIE VIH/SIDA et NTIC): a number of e-classes were opened in certain regions by the UNDP-funded integrated pilot program for Education, HIV/AIDS and NICT in

order to reinforce low-risk behavior through screening tests, to coordinate ministerial committees for the combat against AIDS, and so on.

At the present time MENA has seven (7) e-classes operating in the main towns in the regions.

The forthcoming implementation of the Energy and ICT for Education Network (RETICE) project for which the definition document has now been drafted. Its demonstration phase was actually under way during the Education Triennial with the encouragement of ADEA and the Burkina Faso government in 2012.

Experiments in post-primary and secondary education

We provide below some details of the various initiatives.

- The World Links / Burkina Faso program (2001) led to the equipping of 11 schools and the training of pupils, teachers and teaching supervisors.
- The Partners in learning (PIL) / Burkina Faso program (2004) promoting the integration of Information and Communication Technology (ICT) in Burkina Faso's education system.
- The Global Teenager Project (GTP) / Burkina Faso project led over the period 2001 to 2004 to the equipping of 12 public-sector schools and capacity-building for the use of ICTE tools and Internet access.
- The CyberCenters in Schools Program, an initiative from Quebec/Canada in connection with the Francophonie, led over the period 2004 to 2006 to the equipping of eight MESSRS educational establishments and teaching/training organizations with cybercenters, facilities for access to Internet.
- The NEPAD pilot e-schools project: this NEPAD program embedded in MESSRS began in 2003 with the support of AMD and HP. It involved six secondary schools.

- CERNES – the project for digital resource centers in secondary education. This initiative, conducted in the context of a partnership between MESSRS and IICD, began in 2009 with the aim of setting up a Resource Center to help resolve the problem of the availability of relevant teaching content for education.

Experiments in higher education

We provide a non-exhaustive list below of the principal ICT-related initiatives at this education level. The following may be cited, among others:

- The RESAFAD Project: this contributed to the creation of a University diploma for multimedia communicators (DUCOM) under a joint initiative between the University of Ouagadougou and Maine University in France.
- The ASDI/SAREC Project – ICT aspect: this project relates to the development of ICT at CNRST in the University of Ouagadougou and UPB. Its pilot phase unfolded over the period 2003-2004 and led to the drafting of a Policy Document and an action plan for ICT development in all three establishments.
- The RESEAU Project: this is phase 3 of the French overseas cooperation Higher Education Support Program (PAESUP).
- Implementation of the BMD system designed following an audit of higher education systems in the West African Economic and Monetary Union.
- The EU/ACP Project – formerly MPTIC/UO: this project, 24 months in duration, is aimed at extending the International Forum on the dissemination of best ICT practice currently organized by MTPEN. It was for this reason that the Permanent Secretariat of the National Internet Week (SNI) and Best Practice was set up.
- The Francophone Digital Campus (CNF) of the AUF: launched officially on 15 April 1998 in Paris under the title Francophone Virtual University (UVF), the CNF set itself the goal of support-

ing ICT for the development of networking and the organization of distance master's and doctoral degrees.

- CISCO Regional Academy: this is a joint initiative by UNDP and the CISCO corporation. Its purpose is to train specialists in network technology (design, physical wiring and configuration of active network devices) in LDCs.
- The African Virtual University: this was originally a World Bank project which Burkina Faso joined in 1997. The main goal is to use ICT to provide universities with high-quality educational resources at low cost and to augment access to educational resources for African youth.

Strengths, Weaknesses and Opportunities

Today, showing greater realism, the ministries responsible for education have put in place a sectoral cyberstrategy for e-education whose implementation will be conducted in accordance with five broad strategic focuses.

The major advantage of this policy direction is the political will expressed by the leading managers for the development of ICT in education and research. Notwithstanding that political will, there is genuine enthusiasm on the part of those involved in the sector, and notably in the area of the use of ICT for education (ICTE) by teachers.

Similarly, efforts are being made to improve the organization of the exploitation of the potential of ICT by defining master IT plans in MENA and MESS and the existence of a policy and a plan for the development of ICT in universities and at the National Center for Scientific and Technological Research (CNRST).

Inadequate translation of political will into practice is one of the weaknesses impeding development of ICT in education and research.

Furthermore, there is no clear or coherent vision defining the role of ICT in this sector, which means that the budgets allocated by government give little or no consideration to the funding requirements in the area.

The key opportunity is the adoption of the national cyberstrategy to contribute to the creation of a framework conducive to ICT development in education and research.

In terms of infrastructure, the National IT Administration Network (RESINA) is a major factor in ensuring access for teaching and research establishments to the Internet under relatively favorable conditions.

9. Good Practice

This trend is illustrated by the existence of organizations with responsibility for ICT such as the department for information technology policy orientation and methods (SOMI) at ministerial level, the Departments for ICT promotion (DPTIC) in universities and CNRST, plus IT departments and units at various levels.

We are also seeing a fairly wide offering of training at both initial and specialist levels and in continuous training. In this area, the role of private establishments is increasingly important as they seek to improve their services with efforts to ensure recognition of their diplomas by the African and Malagasy Council for Higher Education (CAMES) and the development of national and international partnerships.

The reforms undertaken in this sector attribute a major role to ICT in ensuring both the internal and the external effectiveness of the system. This is notably the case for the implementation of the Bachelor – Masters – Doctorate (BMD) system in higher education: ICT is increasingly an essential tool for management of the system; the same is true for ICTE, which involves its core activity.

The organization of the National Internet Week (SNI) with its various themes each year on education, youth, employment, women and agriculture and the campaign for use of IT as a tool to enable all social categories to obtain training and to enter the digital world. The organization of the forum on best ICT practice is one of the best initiatives in Burkina Faso for the last 10 years or more.

The use of IDBs in literacy centers to facilitate communication of concepts and interactivity in learning is a further addition to the learning media in non-formal education and universities.

We are currently seeing the emergence of collaborative work between pupils and teachers in high schools as a learning tool based on the use of the Internet and free software resources.

10. Poor Practice

Among the threats is the imposition by Financial and Technical Partners (FTP) of unsuitable technologies such as the acquisition and installation of VSAT in areas with sufficient telecommunications infrastructure. This leads to high recurrent expenditure which is, over time, unsustainable for the beneficiary establishments.

The high cost of ICT for countries like Burkina Faso is also a threat to the implementation of the e-education cyberstrategy.

It is impossible to avoid the observation that each education level defines its own policy, action plan, and so on. In some cases the same ministerial department has parallel initiatives which operate in the absence of any synergy between them. Likewise, institutional compartmentalization in the various sectors of education has comparable consequences.

It is necessary at this level to consider those initiatives that have no institutional embodiment once the project has ended, which explains the lack of synergy in the area of ICT development projects.

There is no institutional embedding in the sense that the various projects are not included in the forward planning and management of government programs and projects, which makes it impossible to plan for a follow-up strategy for ICT projects.

The failure to include ICT formally in the system means that pupils give priority to the recreational dimension over the education and learning aspects.

11. ICT and Continuous Training for Teachers

When considered as a process, continuous training aims to transform the trained individual. Continuous training sets out therefore to arrive at a change in the personality of the trainee by influencing his or her professional practice.

In the context of continuous teacher training, the objective is to change attitudes and ways of working. This training, which is supervised centrally by the Directorate for Pedagogical Research and Development (DRDP) and the Directorate for the Development of Basic Education (DDEB) is a necessity because teachers, if they are to be effective in their work, need constantly to update their specialist skills, extend their general and professional knowledge and remain open to innovations in teaching. With this in mind, and given present ways and means, opportunities and possibilities for training are on offer to Burkina Faso's teachers out in the field.

This training is provided firstly by school principals and secondly by the supervisory team through the following:

- Application of improvement action plans (by teachers themselves),
- Local supervision (provided by school principals),
- School visits and classes provided by the teaching supervision team (CPI and IEPD),
- Pedagogical leadership through the Teaching Leadership Groups (GAP);
- The Teaching Conference,
- Training and retraining courses,
- Training sessions for examinations and professional competitive examinations based partly on classroom-based learning

and partly on distance learning (e.g. Distance training for School Principals - FAD/DE);

- Media-based training,
- Training seminars.

Nothing in the scheme described provides for options for the formalized use of ICT tools. This means that they will be used if they are available or at the initiative of the individual.

In connection with the preparation for professional competitive examinations, teachers use websites for documentary research.

A distance training scheme for teachers has been put in place for the study program of the Institute for the Sciences (IDS). Teachers remain in post and participate in lessons using connection keys.

12. ICT and Initial Teacher Training

In Burkina Faso initial teacher training at primary level is provided by establishments known as National Schools for Primary Teachers (ENEP). There are six of these (Loumbila, Fada N' Gourma, Ouahigouya, Bobo-Dioulasso, Gaoua and Dori); they are connected to the RESINA network and use certain software programs for the management of staff and student teachers.

At the present time, in each of the six ENEPs, in addition to this documentation, the resource center is equipped with IT equipment (computers) and is connected to the Internet.

Where the training is concerned, trainers use tools such as video projectors and interactive digital blackboards for certain classroom sessions.

Each ENEP has an IT training room in which student teachers are introduced to IT in terms of familiarization with computers and the Windows operating system. Added to this is office software: Word, Excel, PowerPoint and Internet navigation. This training is dispensed in two two-hour sessions.

Since 2001 MENA set out, by means of the Ten-year Basic Education Development Plan (PDDEB), to raise national school enrolment to 70% and to improve the quality, relevance and effectiveness of basic education by 2010, all of which necessarily involves a consolidation of the quality of initial and continuous teacher training.

Thus with the support of French cooperation, RESAFAD-TICE and the Project for Support of Basic Education (PAEB) have launched the project for a portal website for five ENEPs. Implemented by national ICTE experts, this site is a platform for information, com-

munication and distance training for use by teachers in post and student teachers. Unfortunately, these websites do not function as defined with regard to the original objectives.

For the conventional training of student teachers, instructors use tools such as video projectors and PowerPoint as teaching media. They also assign research topics to the students, who use the Internet to enrich the content of their presentations and individual and collective homework.

13. Local Digital Content V. International Content

The issue of course content is one that is much more relevant to the post-primary, secondary and higher levels of education. Teachers produce content for their lessons in the classroom as has always been done. The digitization of that content is not still not standard practice for teachers, who have not been trained in using ICT in their professional tasks.

This means that there is less local content on line than international content produced by researchers and teachers in countries somewhat more advanced in the use of ICT in the process of ICT integration into the teaching/learning system.

It should however be noted that what little content can be obtained on line is dominated by scientific material, which is the most favored. Open Educational Resources raise the profile of the existence of international content.

The content which exists is not referenced to enable it to be found on line easily, given the poor user skills which characterize the teaching body as a whole.

Institutionally, it is not often that one comes across strategies to encourage the posting of content on line.

There are a small number of private initiatives in the form of limited-duration projects.

14. ICT and Marginalized Population Groups

The issue of marginalization or discrimination in the use of ICT can be identified with regard to women, young people not in school, the disabled, retired people and other individuals given little consideration by society.

The use of ICT by women is not established practice in Burkina Faso. Girls in particular are inadequately trained right from their arrival in school, high school or college.

It is very often the case at university that young women are still marginalized with respect to new information technology, which does not help them become self-sufficient in using and getting the best advantage from the potential offered by that technology.

The observed facts are no more positive where older women are concerned. Compared with men, they are less well trained and equipped to use ICT, and this can be put down in part to the following:

- Burkina Faso's high level of illiteracy,
- The inadequacy or total lack of ICT training in local languages,
- The very limited telecommunications coverage in rural areas (no Internet network),
- The absence or limited nature of network infrastructure (Internet cafés, ICT associations) in rural areas,
- The cost of training courses, these often being unaffordable for women, especially in rural areas.

Women can use a few basic Internet functionalities such as:

- Internet messaging systems for sending and receiving emails.
- Chat functions on social networks such as Facebook, Yahoo Messenger and MSN Messenger.

- News, i.e. reading news in online daily newspapers (Le Pays, lefaso.net, etc.)

Where governments are concerned, the MDGs have clearly advocated that governments foster the independence of African women through ICT. At international level, there are projects supporting the initiatives of non-profit associations active in the ICT sphere such as ISOC and its ZoomGrants support project which provides grants for innovative ICT projects.

Designers fail to take account of femininity in their production, but the National Internet Week (SNI) did include “ICT and Gender” as a topic for its 5th edition. That topic is at the core of a highly unusual information and awareness-raising campaign. It is time for 52% of the population to get the benefit of technological progress – that is the message from the management level of the ICT Ministry.

15. Conclusions/Closing Summary

(Country Outlook), ongoing development and future prospects

In light of the information derived from personal experience, the results obtained and the difficulties encountered, as well as the greater or lesser enthusiasm of those involved in ICT and the authorities in favor of making ICT an integral part of the education system, we can be reassured that Burkina Faso cannot help but travel further along a path on which it has made so much progress.

This can be said because the government has the intention over the next few years to consolidate its achievements by developing innovative programs based on the following:

- i. Development of the digital economy and access for the general public to the universal electronic communications service through the construction of the basic infrastructure in the shortest possible time.
- ii. Extension of the optical fiber network to cover the entire country and the implementation of a national backbone.
- iii. Creation of a technical hub to act as a competitive excellence cluster and a space for ICT-focused activities and research, bringing together the various actors in the sector with the aim of generating synergy assisted by proximity and mutual interaction.
- iv. Generalization of ICT use in all official departments and agencies in urban centers and in provincial towns and villages.
- v. Promotion of an ICT culture among young people.
- vi. Reinforcement of international cooperation in the ICT domain.
- vii. Extension of the National administration IT network (RESINA).

- viii. Promotion of access to modern postal services throughout the country.
- ix. Implementation of the e-education cyberstrategy.

The implementation of the five sectoral cyberstrategies is the basis of Burkina Faso's national strategy. They are:

- The “e-government” sectoral cyberstrategy,
- The “e-education” sectoral cyberstrategy,
- The “e-health and social welfare” sectoral cyberstrategy,
- The “e-services for the development of the rural world” sectoral cyberstrategy,
- The “e-commerce” sectoral cyberstrategy.
- The specific dimension for education relates to the implementation of the “e-education” sectoral cyberstrategy through its projects and five strategic focuses.

Where the Ministry of National Education is concerned, the following is also noteworthy:

- Implementation of the IT master plan adopted in July 2011.
- The Energy and ICT for Education Network (RETICE) project which is in its trial phase over the period 2014- 2015.

Assistance for some isolated projects directed at the use of ICT in teaching. Consideration for ICT in literacy, the @CTIF project (access to information technologies for training in the classroom).

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Côte d'Ivoire

ICT Integration in Côte d'Ivoire's Education and Training System

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Executive Summary

Education plays an important role in a country's development because it provides a workforce of the quality required for the economy to grow. Côte d'Ivoire, like most African countries that aspire to emerging country status, is devoting great effort to ensuring that education and training of good quality is provided for children and youth. Despite these efforts, it must be recognized that the quality of the education system seems well below expectations. To address this situation, the Ivorian government has embarked on the use of ICT to improve the quality of its education system.

For this report on ICT integration in the Ivorian education system, a document analysis was carried out. The various policy papers, project documents and documents on various resources relating to education and ICT in education in Côte d'Ivoire were analyzed using an approach based primarily on content analysis.

The results show that the Ivorian education system, which has a three-level structure, faces a number of major challenges, such as strong demand for education on the part of an increasingly young population. Despite the insufficiency of certain types of infrastructure, the data show that the government, through the implementation of its e-governance policy (e-Gouv), wishes to use ICT as a tool for the development of Côte d'Ivoire. The very high penetration rate of cell phones in Ivorian society seems to be having an impact on social and communication practices.

Despite the existence of curricula for ICT in education (ICTE), ICT has not fully made its entry into schools for lack of technical and human resources. The school administration does use ICT to manage the system, but implementation of the e-Education policy on the ground is limited to various projects initiated by international partners. Analysis of the data shows that the execution of these projects

gives rise to good practices that should be capitalized but also to bad practices.

The e-Education policy addresses the issue of pre-service and in-service teacher training. Owing to the lack of human and material resources, however, this training includes little or no training in ICT. The question of digital educational content seems not to have been neglected, as the analysis shows that this theme appears in the policy papers as well as the projects implemented under these policies. Another dimension of the e-Education policy is that it takes account of marginalized groups, emphasizing that ICT integration is needed for an inclusive school system.

1. Presentation of the Education System

Since 1960, the Ivorian authorities have made education a national priority and displayed a firm desire to enroll 100% of the country's children in school. The constitution of August 1, 2000, confirms this determination and stipulates that the central government has an obligation to ensure equal access to education for all children in the country, and to this end, provision of education from kindergarten to 6th grade was made free of charge. Since November 22, 2012, two ministries have been in charge of the education and training sector: the Ministry of General and Technical Education (*Ministère de l'Éducation nationale et de l'enseignement technique* – MENET) and the Ministry of Higher Education and Scientific Research (*Ministère de l'Enseignement supérieur et de la recherche scientifique* – MESRS).

The Ivorian education system has three main levels: primary, secondary and tertiary. It enrolls more than 4 million pupils and students, nearly one-fifth of the country's total population, and employs 109,242 teachers. The country has 173 universities and *grandes écoles*, 1,215 high schools and middle schools, and about 13,840 primary schools. Faced with the growing need and demand for education, the state turned toward the private sector under a partnership defined by the Education Act of 1995. While the state retains a majority position in the preschool and primary sub-sectors in terms of enrollment, the private sector dominates at the secondary level, with 74% of the infrastructure. At the tertiary level, only 13% of the universities and *grandes écoles* are public.

Table 1. Statistics on Côte d'Ivoire's education system

	Teachers	Pupils/students	Schools/universities
Primary: Preschool	4,951	91,393	1,358
Primary: Elementary	70,016	2,920,791	12,482
Secondary	31,109	1,132,464	1,215
Higher	3,166	144,270	173
Total	109,242	4,288,918	

Source: MESRS (2012)¹, MENET (2012)²

The primary level comprises preschool and elementary school. Elementary school has six grades: CP1 and CP2 (corresponding to 1st and 2nd grade), CE1 and CE2 (3rd and 4th grade), CM1 and CM2 (5th and 6th grade). The age of enrollment in CP1 is 6 years. Completion of primary education is recognized by a certificate (*certificat d'étude primaire et élémentaire* – CEPE) and leads to the competitive examination for entering middle school. The preschool level has three sections by age; children are enrolled in the youngest section at age 3.

General and technical secondary education is subdivided into two levels: junior and senior. Junior secondary school runs from 7th to 10th grade, and completers receive a junior secondary education certificate (*brevet d'étude du premier cycle* – BEPC). Senior secondary school comprises 11th and 12th grades plus a final year (*classe de terminale*), and completers receive the *baccalauréat* diploma. The *bac* is organized in series: A, C and D for general education, and B, E, F and G for technical education. The higher education system is made up of universities and *grandes écoles*, leading both to univer-

1. Statistical Yearbook of Higher Education, 2009-2010 academic year.

2. Emergency Plan for Production of Basic Statistics of the Ministry of Education (PU-PSB/MEN).

sity degrees (bachelor's, master's, doctorate) and to occupational diplomas (engineers, technician's certificates, etc.).

In the public primary school system, teachers are trained in Teaching Capacity and Training Centers (*centres d'aptitude et de formation pédagogique* – CAFOPs). In the public secondary system, they are trained at the *Ecole normale supérieure* (ENS) in Abidjan for subjects other than physical education, art and music. Physical education teachers are trained at the National Institute for Youth and Sports (*Institut national de la jeunesse et du sport* – INJS), art and music teachers at the National Higher Institute for Art and Cultural Activity (*Institut national supérieur d'art et de l'action culturelle* – INSAAC). In public technical education, teachers are trained at the National Training Institute for Technical and Vocational Education (*Institut pédagogique national de l'enseignement technique et professionnel* – IPNETP), which comes under the MENET. In public higher education, instructors are trained at the Pedagogical Research Institute (*Institut de recherche en pédagogie* – IREP) of Félix Houphouët-Boigny University in Cocody. Not only are there not enough teachers, but the great majority of private sector teachers receive no pre-service training at all.

2. Main Indicators and Challenges of the Education System

Since independence in 1960, Côte d'Ivoire has allocated a large budget share to the education sector. In 2006, current public expenditure on education (excluding debt) amounted to 4.0% of the country's GDP. This value is above the average for the nine countries of the West African region (3.39%). Côte d'Ivoire devotes a higher proportion of its public resources to education than any of the seven other Francophone countries in the region; only the two Anglophone countries considered (Gambia and Ghana) allocate as high a share as Côte d'Ivoire. The government's budgetary efforts for the education sector led to improvement in the enrollment rate (from 67.7% in 1992 to 71.8% in 1996) and the construction of considerable school infrastructure in both rural and urban areas in order to provide quality education to all school-age children.

However, structural adjustment policies beginning in 1990 and the crisis of 2000 to 2010 led to cuts in public education spending (RESEN, 2009³). Although there has been progress in school enrollment, it must be recognized that Côte d'Ivoire is lagging behind in some areas of the effort to achieve the Millennium Development Goals (MDGs). According to the Ministry of Education's Emergency Plan for Production of Basic Statistics (PU-PSB/MEN, 2012), the gross enrollment rate (GER) is still low, particularly at the secondary level: in 2012, the GER was 89.3% at the primary level, 41.9% at the junior secondary level and 25.4% at the senior secondary level.

In general, according to the RESEN (2009), the Ivorian education system is marked by gender- and location-related disparities in ac-

3. Government Report on the National Education System of Côte d'Ivoire (*Rapport d'Etat sur le système éducatif national Côte d'Ivoire*), 2009.

cess to education, a high failure rate on year-end examinations, poor performance in evaluations of scholastic attainment and a high class repetition rate. While the gross enrollment rate in the 2011-2012 school year was 83% overall (83% for girls and 95% for boys), the primary school completion rate was only 59% (2011-2012, MEN). It is also marked by strong demand for education and a shortage of teachers at the primary, secondary and tertiary levels. Mean class size was 43 pupils in 2011-2012, above the national standard of 40 pupils per class.

To achieve the MDGs, the education system will need to tackle a number of challenges, including:

- the teacher/learner ratio, because of the growing demand for education by a young population (RGPH, 20094);
- equity in education, because access to education is unequal by sex and region of residence (RESEN, 2009);
- the growing pressure on classroom space;
- pre-service and in-service training for teachers at the primary, secondary and higher levels;
- the strong presence of private sector institutions in the education system and their generous subsidies from the government;
- the low level of ICT integration in the education/training sector.

4. General Census of Population and Housing (*Recensement général de population et de l'habitat*), 2009.

3. The ICT Situation in Côte d'Ivoire

In Côte d'Ivoire, as in all of Africa, the development of ICT is affecting every sphere of society, but ICT development is lagging behind in Côte d'Ivoire. In 2013, the country was ranked 137th out of 157 countries, with an ICT development index of 1.70 (ITU, 2013). To implement its new sustainable development objectives, the government has introduced a master plan (2012-2017) for e-governance (E-Gouv), implemented by the Ministry for the Post Office and Telecommunications (MPTIC). The government expects e-governance, and hence ICT, to make Côte d'Ivoire an emerging country, modernize the administration to improve service, and improve living conditions. This project headed by MPICT has two main components:

- the e-Administration component, which aims to improve working conditions in public administration through the use of ICT, including the creation of a government intranet.
- the e-Service component, aimed at improving the government services provided to citizens and businesses through the use of ICT. This component includes a number of sector-specific projects, including e-Education, which seeks to foster ICT use in the Ivorian education system.

In implementing this e-Gouv policy, the government carried out a reform of the legal and institutional framework. The parliament has adopted laws on electronic transactions (July 2013), on privacy protection (June 2013) and on combating cybercrime (June 2013). In addition to these legal instruments, the government has undertaken some infrastructure construction, including the rollout of a 6,700-km fiber-optic network covering the entire country. The first section of 1,949 km, scheduled for 2012 or 2013, has made good progress.

Before the e-Gouv project, Côte d'Ivoire had only a switched telephone network, i.e. the fixed-line telephone network, which had a subscription rate of only 1.30% even though the network provides considerable coverage of the country's territory. Two companies, Côte d'Ivoire Telecom and MTN Côte d'Ivoire, serve all 277,548 subscribers. In the cell telephone segment, there are about 20.5 million SIM cards and five operators, whose networks cover the entire land area of Côte d'Ivoire. Statistics from the ITU (2013) show that cell phones are in nearly universal use, with a subscription rate above 96%.

Table 2. Key ICT indicators of Côte d'Ivoire

ICT development index (IDI)	1.70 Côte d'Ivoire ranks 137th of 157 countries.
Fixed-line telephone subscription rate	1.30%
Cell telephone subscription rate	96.27%
Internet connection rate	2.39%

Source: ITU, 2013.

The fixed-line Internet segment had 119,526 subscribers and four Internet access providers (IAPs). Owing to lack of infrastructure, fixed-line Internet service has seen very little development in the towns of the interior. It may be noted, however, that although the MPICT has no data on the subject yet, mobile Internet connections have taken off. Most of the mobile phone companies provide Internet access, and three of them have 3G licenses. This rise in mobile Internet service gives young people easier access to social networks, which has an impact on their social and communication practices. In addition to the SMS, social networks such as Facebook (more than 1,080,000 users) and Twitter are becoming a preferred mode of communication among young people.

While e-commerce has not attained the level of activity achieved by countries such as Kenya, the government has established legal

frameworks to ensure its viability. However, use of mobile-based payment and transfer services is growing. Three of the five mobile phone companies operating in Côte d'Ivoire offer payment and transfer services by mobile phone. In terms of interconnection, the availability of both microwave relay links and VSAT stations is a major asset.

4. Curricula and ICT

The Ivorian education system has some experience of educational technology. Côte d'Ivoire was one of the countries that experimented with television-based education (Désalmand, 1986). In addition, from 1987 to 2000, a series of governmental and administrative decisions aimed at initiating ICT integration in secondary schools led to three institutional projects to introduce ICT (Djédjé, 2007). The first failed at the experimental phase (1987-1988); the second was never implemented; and the third was put on hold. From 2004 to 2006, other experiments were conducted, and the Ministry of Education even developed an ICT master plan (Mian Bi, 2010).

The adoption of executive order 2012-894 of September 19, 2012, designating ICTE as an academic subject in preschool, primary and secondary education was a turning point in the government's engagement in favor of using ICT in education. The order provides for the integration of ICT in education and training, both as a tool to improve teaching/learning and as a subject of study. To implement the order, the MENET's Directorate for Teaching Methods and In-Service Training (DPFC) developed ICTE programs and teacher's guides for preschool (excluding the first year), primary school and junior secondary school.⁵ Each of the three documents begins by specifying the skills expected and the teaching methods to be used for instruction in ICT, then lays out the ICTE program and ends with the teacher's guide.

Concerning the expected skills, at the end of preschool learners should be able to identify the components of a computer system. At the end of primary school, they should be able to use ICT tools to explore their environment and to enhance their learning capacities in other subjects. At the end of junior secondary school, learners

5. The programs and teacher's guide can be downloaded from the MENET Web portal.

should be able to identify the components of a computer system, assess the performance of a microcomputer's various components, produce documents using office software, use the Internet for information retrieval and communicate by email.

In view of these developments, primary and secondary teacher training programs, including both the CAFOPs and the ENS in Abidjan, now cover ICTE. Although the development of these ICTE programs is to be encouraged as a real step forward, the programs for primary and especially for secondary school display a number of problems with respect to the skills expected at the end of junior secondary school. How, for example, can a learner of that age and level of knowledge be expected to assess the performance of a microprocessor or hard drive? Moreover, the junior secondary ICTE program puts more emphasis on training in the use of office automation software than on learners using ICT tools for learning purposes.

Furthermore, although ICTE has been added as a new subject of study, it did not appear on the primary and secondary school class schedules at the beginning of the 2013-2014 school year, owing to the shortage of computer equipment and of resource persons for teaching ICTE. The same situation is found in the CAFOPs, where primary-level teachers are trained. The ENS in Abidjan has resource persons to train teachers in integrating ICT in the program, but has not yet acquired computer equipment.

In higher education, thanks to the implementation of the bachelor's-master's-doctorate reform, all public universities have all added ICT as a methodological subject in their programs. As at the primary and secondary levels, however, instruction in ICTE is held back by a lack of equipment.

5. ICT in School Management and Administration, with Examples

In Ivorian educational institutions, there is an administrative staff, in addition to learners and the teaching staff. These institutions are headed by a principal at the primary level, a principal or headmaster at the secondary level and a rector, university president or director-general in higher education. As noted by Djédjé (2007), Côte d'Ivoire's use of ICT in school administration dates from about 1985, when, with the advent of ICT, some school administrations decided to use it to palliate the lack of resources in school libraries or to improve the management of their institutions. Although at the time these schools acted in isolation (Djédjé, 2007), in 2012 the MENET and the MESRS acquired ICT tools for management of school administration as part of the implementation of the e-Administration component and the e-Education project.

Among the many examples of successful applications of ICT in school administration, we may mention the following:

- Interconnection of central government bodies with decentralized departments or institutions. The MENET has an interconnection among thirteen central bodies: the minister's cabinet, seven central departments, five related departments and a single regional department. The MESRS has an intranet at the level of the minister's cabinet and, as part of the implementation of the e-Education project, has interconnected three public universities out of five as well as the two public *grandes écoles* under its authority. In the process, the MESRS acquired a data center that is housed at Félix Houphouët-Boigny University in Cocody.

- The creation of two Internet portals (<http://www.education.gouv.ci/> and <http://www.enseignement.gouv.ci/>), that provide administrative information. On these portals, users can access ministry organization charts; a listing of schools, universities and *grandes écoles*, as well as the results of examinations, such as the competitive exam for admission to the CAFOPs or the exam for the advanced technician's certificate (*brevet de technicien supérieur* – BTS). Education system staff can access the Integrated Management System for Civil Servants and Government Employees (*Système intégré de gestion des fonctionnaires et agents de l'Etat* – SYGFAE). This system, introduced by the Ministry of State for the Civil Service and Administrative Reform, enables education staff, after authentication, to request leave of absence or to access their evaluation rating and the documents related to their postings. For the 2012-2013 school examination session, the MENET used a software program for deliberation over the BEPC and *baccalauréat* examinations. Moreover, since 2012 dedicated systems have enabled students at the secondary and higher levels to enroll online at the beginning of the school year.
- The use of ICT in some primary, secondary and university-level institutions (Djédjé, 2007). The administrations of these institutions use ICT for administrative management, printing lists of pupils per class, printing lists of administrative and teaching staff, writing evaluations, printing report cards or student transcripts. In addition, some private universities and *grandes écoles* have software for management of student affairs and schedules and for printing report cards and transcripts.

Behind these positive examples, however, lie a great many weaknesses. According to the management of the ICT Resource Center (*Centre de ressources informatiques* – CRI), the interconnection rate is 0.11% and cable installation rate 0.008%. This means that most of the 36 regional education departments (DRENETs) under the MENET, of the 14 CAFOPs, of the 36 Teaching Methods and

In-Service Training Offices (*Antennes de la pédagogie et de la formation continue* – APFC) and of the 186 preschool and primary education districts have neither interconnected local networks nor any Internet connection. Most of the efforts made to use ICT for school management and administration seem to be located at the central level, but even there, the portal of the examinations department is currently isolated owing to a malfunction on its radio station. Moreover, the Internet access service is no longer functional because the firewall licenses were not renewed.

Where the MESRS is concerned, apart from the central administration, most of the administrations of the institutions under the ministry's authority seem to be lacking in ICT equipment. The interconnection of public universities and *grandes écoles* is still not functional, and although the data center is equipped it is not yet in service. Moreover, none of the public universities or *grandes écoles* has software for managing academic affairs and none has Internet access. While the central departments of the MESRS have Web portals, most public universities do not.

6. The Current Situation of ICTE

In its new education policy, embodied in the e-Education project, Côte d'Ivoire wishes to integrate ICT in its education system, as a management tool, as a tool for improving the teaching/learning process and as a subject of study in its own right. For the implementation of the e-Education project, both the MENET and the MESRS developed an ICT strategic plan to provide a framework for the various ICT integration projects. Both of the strategic plans emphasize certain key points, such as acquisition of computer equipment, production of educational content and training of resource persons.

The MENET, heading up the implementation of the e-Education policy, has several major projects in progress:

- The Francophone Initiative for Distance Teacher Training (*Initiative francophone pour la formation à distance des maîtres* – IFADEM): This two-year project is financed by the *Organisation internationale de la Francophonie* (OIF) and the *Agence Universitaire de la Francophonie* (AUF). The project concerns 500 primary-level assistant teachers with less than ten years' seniority, working at any level of the education system where French is the main teaching language. The training course consists of about 200 hours over a nine-month period. It will include three face-to-face assemblies of the teachers concerned, lasting two to three days; the rest of the course will be delivered at distance.
- Sankoré: A one-year project, partnered by the Embassy of France and ADIENA, that aims to set up and equip 600 digital classes, for primary, secondary and higher education institutions, regional education departments (DRENETs), the APFCs, the CAFOPs and non-governmental organizations (NGOs).
- UNESCO-China Funds in Trust (CFIT) project: Capacity Building for Teacher Supervisors and In-Service Teacher Training:

This four-year project is financed by the Embassy of China and implemented by UNESCO. It concerns the provision of infrastructure and equipment for training of teacher supervisors and teachers as well as capacity building for both categories through open distance training courses.

- The Debt Reduction/Development Contract (*Contrat désendettement développement –C2D*) with the French Development Agency (AFD), which aims to provide computer equipment to 14 CAFOPs.
- A project initiated by UNESCO, Nokia and Orange Côte d'Ivoire in which mobile phones are used to collect school statistics. This experiment, which is under way in one regional education department, is coordinated by the Statistics, Evaluation and Planning Department of the MENET.
- The Digital Generation project of the telephone company MTN Côte d'Ivoire, which is equipping secondary schools in Côte d'Ivoire with Internet-connected multimedia rooms. Since 2007, the project has equipped 22 schools around the country, and 12 more (all in the country's interior) are to be upgraded in 2013-2014.

The strength of the above projects lies in their governance and in the fields covered. Concerning governance, all of them have a coordinating unit at cabinet level in the MENET, a setup that makes complementarities more easily visible. As for fields of action, all of the projects cover the fields of equipment provision, training and production of educational content.

For the MESRS, the first phase of implementation of the e-Education project involved interconnecting three public universities and two public *grandes écoles*, creating and equipping a data center at Félix Houphouët-Boigny University and three lecture halls for distance teaching in each of the three interconnected public universities. In addition to this infrastructure, the ministry put together an Ivorian

Telecommunications Network for Education and Research (*Réseau ivoirien de télécommunication pour l'enseignement et la recherche* – RITER), which consists of the ICT directors of the public universities and *grandes écoles*. The network meets weekly to deliberate on how best to implement the e-Education policy in higher education. The ministry has also set up a training plan for university staff. For example, trainers in the universities had at least 40 hours of training in how to put their courses online. Training actions have been organized for the managers of university libraries, managers of registrar's offices and ICT department managers.

The second phase of implementation of e-Education in the universities will consist in extending interconnection to two more public universities and to research centers, as well as bringing the data center onstream so that courses can be posted online and open distance learning can be encouraged. In this second phase, projects such as the AFD's C2D project will equip institutions with computer hardware. In addition to these projects, the African Virtual Campus (AVC) Abidjan is hosted by the University of Cocody in the same building as the public universities' data center. The objective of this UNSECO initiative is training of trainers at all three educational levels in the production of educational content and how to publish it online.

The strong point of the MESRS project is the establishment of the RITER. However, the large number of stakeholders involved in implementing the e-Education project in the universities may be a cause for concern when it comes to interconnecting them. Moreover, the time that elapses between the provision of equipment and the start-up of service may well compromise the implementation of the project. The fact is that equipment installed since 2012 may be defective when it is put into service, which will occasion additional costs that may then compromise its being put into service at all.

In both the MENET and the MESRS, the implementation of all these projects emphasizes sustainability rather than scaling up. Indeed,

in view of the centralization of financial management in government administrations, it is only sensible to introduce an economic model that will enable the equipped institutions to meet their own future need to replace computer equipment and renew user licenses for proprietary software. In addition, although Côte d'Ivoire seems well placed to cover its energy needs, it is always worthwhile to provide for alternative solutions.

Generally speaking, the e-Education project as currently conceived of should foster open collaboration between the MENET and the MESRS. It should lay emphasis on a clear software policy that takes the country's actual economic situation into account. To this end, it should develop a mechanism for the purchase and renewal of user licenses and consider open-source solutions in addition to proprietary solutions, or *vice versa*. The project should also take care to develop a plan for pre-service and especially in-service training for the many teachers and administrative staff in service. While working to provide equipment to institutions, the e-Education project should at the same time consider the issue of individual equipment for teachers and supervisory staff.

To work with the two technical ministries in implementing the e-Education policy, an Ivorian Association for ICT Integration in Education (*Association ivoirienne pour l'intégration des TIC en éducation* – AIIICTE) has been formed, comprising university trainers, primary and secondary school teachers, and ICT sector business people in Côte d'Ivoire. The association has started a project called "Mornings for ICT in Education". These monthly meetings allow the various stakeholders to meet and discuss the issues involved in integrating ICT in education.

7. Good Practices

Although it may seem recent, the initiative to integrate ICT in the education system has given rise to certain good practices:

- strengthening of the ICT institutional framework at the national and sector levels, which gives the government a national view of ICT integration in the education and training sector;
- use of ICT as an administrative management tool;
- capacity building for education system actors. The success of ICT integration in education depends on the people working in the education system. For an innovation using a tool that is often not found in their immediate environment, capacity building becomes an opportunity for awareness raising and training;
- development of curricula and content. Curricula are very important in order to harmonize practices on the use of ICT in education, because they translate the policy objectives of the institutional and sector framework into the skills expected of learners. In addition, curriculum development will encourage the production and publication of digital educational content;
- interconnection in order to broaden the supply of education. One major problem of our education systems is that they do not have enough infrastructure, human resources and library resources to satisfy the strong demand for education. Interconnecting the universities will thus make it possible to pool resources and provide education and training to more people;
- equipping educational institutions with computer hardware;
- spaces for discussion on ICT in education. To integrate ICT successfully in the education system, it is important to have venues for discussion between education system stakeholders and people in the ICT business, to allow for cross-pollination of ideas and a shared understanding of the major issues and challenges involved in integrating ICT in education.

8. Bad Practices

Implementation of the e-Education policy in Côte d'Ivoire has also led to bad practices, including the following:

- the lack of computer equipment in institutions under the authority of the MENET and the MESRS;
- the online enrollment initiative. Although the objective is worthy, this initiative needs to be rethought, since the current Internet utilization rate in Côte d'Ivoire is at most 3%;
- the lack of a software policy in the implementation of the e-Education policy. To avoid situations such as the interruption of Internet service at the MENET, it is important for the ministries to adopt a policy on software purchasing and renewal of user licenses for the proprietary software used. In so doing, they should consider including open-source solutions;
- the lack of a policy on replacement of equipment. Owing to a defective radio station, the Web portals of MENET departments were cut off from the central ministry portal. It is urgent to establish an economic model for sustainability in the implementation of the e-Education policy;
- the ban on cell phones in secondary schools. Whereas the MENET encourages online enrollment with payment by cell phone, it prohibits these telephones in school. Studies have shown, however, that these tools can be invaluable for ICT integration policies (Mian Bi, 2012). As there are 20.5 million active SIM cards in Côte d'Ivoire, it is urgent to review this measure;
- the lack of a framework for cooperation between the MENET and the MESRS. It is important to have such a framework to ensure that the transition from secondary to higher education is not too abrupt a change for learners;
- the lag time between the issuing of executive orders and their application on the ground. Although ICTE has been officially

designated as a subject of study, class schedules in primary and secondary education do not even mention it;

- the lack of an in-service training plan to help teachers in post include ICT in their lessons.

9. ICT and in-service Teacher Training

As part of the UNESCO/CFIT project, the MENET has recently set up a plan for in-service teacher training. Through the use of open distance training, the project gives new impetus to the MENET's in-service training policy run by the DPFC. We should also mention the IFADEM initiative for in-service teacher training. But whereas the IFADEM project is more focused on teachers, the CFIT project covers both teachers and MENET supervisors. As part of the implementation of the ICTE program at the primary, secondary and tertiary levels, the MENET organized an in-service training session for a group of 50 teachers who already had some degree of familiarity with ICT. This session, leading to an attestation, gave them the opportunity to expand their knowledge in order to be able to deliver ICTE courses.

At the MESRS, initiatives to integrate ICT in in-service teacher training were conducted by the Francophone Digital Campuses (*Campus numériques francophones* – CNF) of the *Agence Universitaire de la Francophonie* (AUF). These courses, leading to diplomas, trained a number of resource persons for integration of ICT in education. In 2008, for example, the International Francophone Network of Training-of-Trainers Institutions (*Réseau international francophone des établissements de formation des formateurs*) and the Abidjan CNF organized a training workshop for trainers in Côte d'Ivoire's public universities and *grandes écoles*. But it was not until the implementation of the bachelor's-master's-doctorate reform that the MESRS undertook to train university trainers in how to publish courses online. These 40-hour training modules allowed some teachers to gain their first experience of computers. The objective of the training course was to enable university trainers to design courses and put them online using Moodle. This in-service training

course, the first of its kind, was organized by the CNF. It reached the great majority of trainers in all public universities and *grandes écoles* under the MESRS's authority and led to an "ICT passport" issued by the CNF.

As we have seen, although the ministries did have in-service teacher training plans, the latter contained little or no ICT content (Mian Bi, 2010). Moreover, although these plans were praiseworthy, there was little follow-up due to lack of hardware in the line institutions, and the training thus had no lasting impact for the majority of the trainees.

10. ICT and pre-service Teacher Training

Integration of ICT in pre-service teacher training is an absolute necessity. African education systems are in a crisis of quality, and an improvement in the quality of pre-service training can be a solution. At a time when traditional pre-service training systems have shown their limits, Africa must move toward the use of ICT, which has brought promising results elsewhere in the world (Mian Bi, 2010).

In view of this situation, the ENS in Abidjan has been integrating ICT in teacher training for more than a decade. But this is done only in two sections of the Science and Technology Department (Mathematics and Physical Sciences) and for CAFOP instructors trained in the Education Sciences Department (Mian Bi, 2010). With the implementation of the bachelor's-master's-doctorate reform in higher education and the adoption of the executive order declaring ICTE a subject of study in secondary education, the new pedagogical models at the ENS include ICT as both a scholastic subject and a cross-cutting discipline in pre-service training.

In the CAFOPs, as in the Abidjan ENS, there was little or no ICT in training programs before 2012. Since ICTE was made an official subject of study, the DPFC's programs for all CAFOPs in Côte d'Ivoire have included instruction in ICTE.

Although ICTE is written into the training programs, actual teaching of the subject in pre-service training is highly problematic because of the shortages of equipment and/or resource persons in the training institutions. In the CAFOPs, for example, the pedagogical models make no mention of ICTE, whereas at the ENS, ICT is duly included in class schedules. Although resource persons are available, the lack of computer resources will limit the impact of this.

11. Local vs. International Digital Content

Local production of digital educational content is a major issue that should be addressed in all initiatives aimed at integrating ICT in education. According to Désalmand (1988), the failure of educational television in most African countries is due in part to the lack of local content. Local digital content is thus becoming a matter of some import in African countries, mainly in Francophone Africa. A research study has shown that the lack of digital content in French could slow ICT integration in education in Francophone countries⁶.

Implementation of the e-Education policy has indeed given a certain emphasis to local production of digital educational content. Most of the MENET and MESRS projects include a component on local production of content, and the government created and equipped the data center specifically for this purpose.

Local educational content should to a large extent be used to complement international digital educational content. At the MENET, the Sankoré project will create a portal of digital content for all African countries that benefit from the project. Similarly, IFADEM will devote a large component of its training of country trainers program to the production of digital educational content. This content will be made available along with the content produced in other African countries participating in the initiative; in the meantime, the MENET's ICT programs and teacher's guide can be accessed on its portal.

The MESRS has taken account of this by initiating training seminars in the production and online publication of courses.

6. <http://www.adjectif.net/spip/spip.php?article112&lang=fr>

12. ICT and Marginalized Groups

In its World Education Report 2013, UNESCO defines the marginalized as generally being those with the lowest levels of education because of an educational disadvantage. Groups that are often marginalized include women, persons living with HIV, the elderly, the disabled, etc. In a declaration published on its website on September 12, 2013, the French High Council for Gender Equality (*Haut conseil français à l'égalité entre les femmes et les hommes* – HCEF) argues that digital education at school should be an opportunity for gender equality. To this end, the HCEF (2013) emphasizes two important points: digital educational content and practices. Where digital content is concerned, the HCEF requests that special attention be paid to ensuring that digital educational content does not reproduce gender stereotypes; concerning practices, it insists that training of trainers should take account of gender equality. These two points raised by the HCEF show that unless care is taken, the introduction of ICT in education may well exacerbate inequality by sidelining the marginalized elements of the population. The HCEF declaration echoes the official recommendations of the United Nations institutions that ICT use should be inclusive in nature.

ICT initiatives benefiting marginalized groups are generally rare in Côte d'Ivoire. There are studies showing that girls make better use of ICT at school than boys of the same age (N'déde, 2010). According to the World Bank (2013), Côte d'Ivoire has taken two initiatives in favor of women. In the first, the NGO Epsilon-Technology created an online contest called African IT Girl, targeting girls with a view to helping them enter the digital era and become forces to be reckoned with in the information technology sector. The second project, by the NGO *Femmes et TIC* ("Women and ICT", <http://www.femmes-tic.org>), tries with mixed success to sensitize and initiate girls and

women in the use of ICT. In partnership with the *Organisation internationale de la Francophonie* (OIF), it organized a workshop on December 17-21, 2012, on “Content Management Technology: The Drupal CMS System”. The Sankoré Côte d’Ivoire project made a grant of 100 digital classes to NGOs that work with marginalized groups.

13. Conclusion/Synthesis

Evolution and Prospects

Since independence in 1960, the Ivorian authorities have made schooling for all children one of their priorities. This priority was confirmed in the constitution of August 2000, which obliges the government to ensure equal access to education for all children. The Ivorian education system has three levels: primary, secondary and higher. The private education sector has a strong presence: to satisfy the strong demand for education, the state signed a partnership with the private sector through a new education law. Public school teachers receive pre-service training; those in private schools receive none.

Although government spending on education amounts to about 4% of GDP, the quality of the education system leaves much to be desired: a low enrollment rate, unequal access depending on gender and location, a high failure rate on end-of-year examinations, poor performance on learning evaluation tests and a very high teacher/learner ratio. To attain the MDGs, the system will need to meet a number of challenges, including intelligent integration of ICT.

While attempts to integrate ICT in the Ivorian education system are not new, it was not until 2012 that ICTE curricula were developed, as part of the implementation of the e-Education project of the e-governance policy (e-Gouv). Although this ICTE program has not yet been included in class schedules at the primary and secondary levels, owing to the shortage of material and human resources, the school administration does use ICT. This use is more pronounced in the ministerial cabinets, and seems to be limited in the administrations of decentralized bodies. This gives the impression of a digital

divide between the central departments and those placed under the ministries' oversight.

The ICT policy is implemented in the Ivorian education system through the e-Education project, which in turn has given rise to a number of specific projects. While the implementation of this policy has displayed good practices, such as the ministries' clear visibility on projects, it has also been characterized by a number of bad practices, such as the lack of close collaboration between ministries. The e-Education project also led to the development of ICTE curricula that have been integrated into Ivorian programs of pre-service and in-service teacher training.

To make a success of the ICT integration policy, the issue of digital educational content was addressed by the various projects implemented. Local digital content should be used in intelligent complementarity with international content.

The integration of ICT in the education system should take account of marginalized groups in order to encourage their enrollment in school. Although this has not yet been done completely, there are several projects that promote ICT training for women and girls.

In integrating ICT in the education system, the government, through the two ministries responsible for the education/training sector, will need to address certain important points highlighted by this review. These include:

- **Infrastructure:** The e-Gouv policy calls for the construction of a 67,000-km fiber-optic network connecting all localities in the country. In addition, however, it will be necessary to renovate the existing buildings, which are barely or not at all functional.
- **ICT equipment:** As this report has shown, lack of equipment is holding back the implementation of ICTE as a subject of study in classes. It is therefore necessary to introduce a policy on provision and replacement of equipment, both for educational

institutions and for other actors in the education system. In addition to the possibilities of offering tax breaks, the government should encourage public-private partnership (PPP) initiatives. Given the high penetration rate of cell phones in Côte d'Ivoire, it is also time for the MENET to consider ways of integrating them into the education system.

- Content: On the content issue, a software policy should be set in order to facilitate the acquisition and renewal of user licenses. It is also time that the technical ministries considered open-source solutions, which could be used in addition to proprietary solutions. The ministries should also introduce a policy on local production of digital educational content.
- Training: For meaningful use of ICT in the Ivorian education system, a plan to train resource persons is needed:
 - > Teachers and trainers: the success of ICT integration in education largely depends on these two groups. It is therefore necessary to set up a program of pre-service and especially in-service training of teachers and trainers. This training should aim for proficiency with ICT but also with how to use it for teaching/learning.
 - > Learners: For efficient of ICTE in their learning practices, training should be organized to initiate them in using ICT.
 - > Administrative staff: The success of ICT integration also depends on school administrations' perception of its utility. Thus, training of administrative staff will be based on proficiency with ICT tools for school administration.
 - > Technical support staff: This staff category will be useful for its knowledge of how to maintain and manage the stock of computer equipment. Its role will be to relieve both teachers and administrators of the tasks of maintaining the computer population.
 - > Researchers in ICTE: This training, to be based on humanities research practices, will provide ministries with resource persons to conduct field research.

- Sustainability: The implementation of the e-Education policy should address the issue of sustainability. To this end, the government should devise economic models that will enable institutions to replace equipment at need.
- Electric power supply: Although the power grid covers much of the country's land area, provision is unstable. It is important to address this issue as part of the implementation of the e-Education policy.

The points listed above should not be considered sequentially but rather in combination, in order to achieve sustainable integration of ICT in Côte d'Ivoire's education system.

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Paraguay

The Integration of ICT in Paraguay's Education System

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Executive Summary

This paper presents the following regarding ICT Integration in Paraguay's education system:

1. Background Information on the Republic of Paraguay

With over 6.4 million inhabitants, Paraguay is considered a low-middle income country. During 2000-2010, Paraguay experienced steady economic growth, accumulating approximately a 40% increase in gross domestic product per capita. However, the UNPD's Human Development Index places Paraguay among the countries with the lowest indicators in the Latin American region, and there has been little change in performance over the last decade. The country has a very young demographic: 44% of the population is under 20 years, implying important challenges for the education system.

2. Educational Overview of Paraguay

The General Education Law of 1998 positions education as a priority for the consolidation of democracy, for decreasing inequalities and creating new opportunities for all of the inhabitants of the country. During the 2000-2011 period, there was an expansion of the coverage of primary and secondary education levels. Currently, the net primary enrollment rate is above 95% and 71% for the secondary level.

3. ICT Overview of Paraguay

In 2011, the Paraguay government launched the ICT Director Plan. This road map develops a strategy for making ICT a strategic priority to achieve long-term sustainable development in Paraguay. The

ICT Director Plan builds upon the advances of the ICT Master Plan carried out between 2009 and 2011 with support from the South Korean Government. In 2013, a bill was passed to create the framework for implementing ICT in the public sector by developing the National Secretariat of ICT (SENATIC) which aims to consolidate ICT policies thus far carried out, ensuring the continuity of the ICT Director Plan in order to benefit the education, health, political, economic and social sectors. SENATIC and the Director Plan face numerous challenges as United Nation's International Telecommunication Union (ITU) rank Paraguay eighth in South America on the ICT Development Index (IDI).

4. Analysis: ICT Integration and Teacher Training in Paraguay

Education ICT integration initiatives denote a slow evolution and a long and disjointed journey with scattered proposals and isolated experiences by government, civil society and private sector. A National Plan is needed to integrate ICT into the education system, in the framework of the national ICT Director Plan and relevant to the national reality.

The first experiences of teacher training in the use of ICT emerged in the country with a small group of teachers, from private institutions and non-governmental organizations, within the framework of the educational reform of the 1990s, when faced with challenges for mainstreaming ICT resources in the classroom. Other initiatives, although isolated and scattered in time, are carried out by the public sector

5. Analysis: ICT Integration and Initiatives that contribute to providing learning opportunities to marginalized groups

In Paraguay, most of the initiatives that contribute to providing learning opportunities to marginalized groups through the integration of ICT are given a boost from the private sector, NGOs or international organizations. Although supported and or endorsed by the government, these initiatives emerge as a response from civil society to improve the lives of people who are in vulnerable situations: indigenous, rural, and disabled, among others.

1. Background Information on the Republic of Paraguay¹

Paraguay is located in central South America. The country is bordered on the south, west and southwest by Argentina, Brazil to the northeast and Bolivia to the northwest. The 1992 Constitution recognizes two official languages: Spanish and Guaraní. It has an area of 406,752 km² and a population of 6,457,976 people (2010). The Human Development Index



places Paraguay among the countries with the lowest indicators in the Latin American region, there has been little change in performance over the last decade. During the 2000 – 2010 decade, Paraguay experienced steady economic growth, accumulating approximately a 40% increase in gross domestic product per capita and is considered a lower-middle income country. Also during this period there was an improvement in the distribution of wealth among the whole population, as reflected in the decline in value of the GINI index. The probability of dying during the first five years of life has been reduced over the last decade while life expectancy at birth has increased slightly. However, the proportion of population without sufficient income to cover basic food and services reaches 55%. The country has a very young demographic: 44% of the population

1. All of the data on this page is taken from: ILPE-OEI (2012), *Perfil Paraguay, Sistema de Información de Tendencias Educativas en América Latina (SITEAL)*, www.siteal.ilpe-oei.org.

is under 20 years, implying important challenges for the education system.

General Data		Development Data	
Land mass	406,752 km ²	GDP (PPP) per capita	\$4,710 (2010)
Political System	Representative Democratic Republic	GINI	0.533 (2010)
Administrative Political Divisions	17 Departments, 245 Municipalities	Human Development Index (HDI)	0.612 (2000)
Official Language	Spanish and Guarani	HDI in the year 2000	0.761 (2011)
		HDI Global Position	107 (2011)
		HDI Regional Position	15 (2011)
		Unemployment Rate	5.5% (2011)
Demographic Data		Social Spending Data	
Total Population	6.459.617 (2010)	Total Social Spending as % of GDP	11% (2009)
Urban Population		Total Education Spending as % of GDP	4.7% (2009)
Dependency Rate	63.1% (2010)	Total Health Spending as % of GDP	2.3% (2010)
Migration Rate	1.3% (2005-10)		
Fertility Rate	2.8% (2010-15)		
Life expectancy	78.2 yrs (2010-15)		

2. Educational Overview of Paraguay²

The General Education Law of 1998 positions education as a priority for the consolidation of democracy, for decreasing inequalities and creating new opportunities for all of the inhabitants of the country.³ During the 2000-2011 period, there was an expansion of the coverage of primary and secondary education levels. Currently, the net primary enrollment rate is above 95% and 71% for the secondary level.

Compulsory education as per the General Education Law stretches from the age of five until the completion of middle school, entailing a minimum of nine years of schooling.

Late enrollment

Compulsory school attendance as established by law indicates that at five years of age, all children should be attending the preschool. This objective has been basically met with almost all children attending primary school.

Early Schooling

Currently, 65% of all 5 year olds comply with compulsory education and are enrolled in pre-primary schooling. This implies an increase of over 23% during the period 2000-2011. However, the gap between social sectors remains wide. 74% of Paraguayan children in the most privileged households attend the initial level, while only half of the 5 year olds in the most disadvantaged households are attending.

2. All of the data on this page is taken from: IIPE-OEI (2012), *Perfil Paraguay, Sistema de Información de Tendencias Educativas en América Latina (SITEAL)*, www.siteal.iipe-oei.org.

3. MEC (1998), *Ley General de Educación*, <http://www.mec.gov.py/cms/entradas/68936>

Access, repetition and graduation from primary education

In 2011, the net primary enrollment rate exceeds 95%. The proportion of students who attended primary level aged two or more years than their grade level is about 19%. Also, 93% of adolescents aged 15 years who entered the primary level, they completed it. It should be noted a marked improvement in the completion for this level, as it has increased by 15% in the last decade.

Access, repetition, and graduation from secondary education

In 2011, the net secondary enrollment rate reached 71%. This implies an expansion of about 30% for the 2000-2011 periods. This expansion was accompanied by an improvement in the proportion of students who attend the secondary level with two or more years of age at the year they enrolled: while in 2000 this value was over 30%, in 2011 was reduced to 19%. However, the graduation rate reached about 70%. That is, 7 out of 10 aged between 20 and 22 years who were admitted to the secondary level, managed to finish it. Moreover, access to and the manner in which it is engaged and then finished, depends closely upon one's social origins, a situation that has not been reversed during the 2000-2011 period.

Access and graduation of higher education

In 2011, 33% of young people between 20 and 21 years attended higher education. This value was 21% in 2006. Regarding graduation, values remain stable for the last decade: about 35% of young people between 30 and 33 years who were admitted to higher education managed to complete it.

3. ICT Overview of Paraguay⁴

In 2011, the Paraguay government launched the ICT Director Plan.⁵ This road map develops a strategy for making ICT a strategic priority to achieve long-term sustainable development in Paraguay. The ICT Director Plan builds upon the advances of the ICT Master Plan carried out between 2009 and 2011 with support from the South Korean Government, and today includes four thematic strategies that encompass ten strategic priorities, indicating initiatives and program activities:⁶

Thematic Strategies	Strategic Priorities
1. Service	<ul style="list-style-type: none">• E-Government• Infrastructure
2. Opportunity	<ul style="list-style-type: none">• Human Resource Development• Awareness
3. Growth	<ul style="list-style-type: none">• ICT Industry• E-Commerce• ICT Standards• Research And Development
4. Reliability – Formalization	<ul style="list-style-type: none">• Legal Framework• Organization

In 2013, a bill was passed to create the framework for implementing ICT in the public sector by developing the National Secretariat of ICT (SENATIC) with the objective of promoting sustainable development of the country through the use of ICT. SENATIC was created by the Secretariat for ICT (SETIC), where the ICT Director Plan was initially developed. This new Secretariat aims to consolidate ICT policies thus far carried out, ensuring the continuity of the

4. Costa Bordón, María Cristina. «Camino recorrido: Sistematización de los esfuerzos realizados por el Ministerio de Educación y Cultura en el periodo 1990-2010». Revista Paraguaya de Educación, MEC / OEI / Santillana S.A., Noviembre de 2012.
5. SETICS (2011), *Decreto del Plan Director de Tecnologías de la Información y Comunicación (TICs)*, <http://tinyurl.com/l2zjfnm>
6. *Plan Director TICs (2011)*, Vision : Paraguay Digital en la Sociedad del Conocimiento, <http://www.ticpy.org/TableroPlanMaestro>

ICT Director Plan in order to benefit the education, health, political, economic and social sectors.⁷

According to the United Nation’s International Telecommunication Union (ITU) *Measuring the Information Society* 2012 report, Paraguay ranks eighth in South America on the ICT Development Index (IDI).⁸

Paraguay	Global Rank	South America Rank	ICT Development Index (IDI) 2011			
TOTAL IDI	97	8	IDI Indicators			
1. Access	95	8	Fixed-telephone subscriptions	Mobile-cellular subscriptions	% of households with computer	% of households with Internet
			5.6%	99.4%	22.7%	19.3%
2. Use	103	10	% of individuals using the Internet (2011 data)	Fixed-broadband Internet subscriptions	Active mobile-broadband subscriptions	
			23.9%	1.0%	4.5%	
3. Skills	96	8	Secondary Gross Enrolment Ratio	Tertiary Gross Enrolment Ratio	Adult Literacy Rate	
			56.9%	36.6%	94.6%	

Given these indicators, SENATIC and the Director Plan face numerous challenges to deal with Paraguay’s low ICT penetration figures both regionally and globally. The high cost of Internet connectivity and the inability of many families to purchase a computer have placed the country among those with the least access to the global information society. A limited ICT budget has led to a delay in the development of ICT initiatives in the education sector, thus hampering efforts to promote sustainable human development and face other political challenges.

7. SETICS (2013), *Se promulga la Ley N° 4989 que crea la SENATICs*, <http://tinyurl.com/kfjrwl2>
 8. International Telecommunication Union (2012), *Measuring the Information Society*, http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2012/MIS2012_without_Annex_4.pdf

4. Analysis: ICT Integration and Teacher Training in Paraguay

Education ICT integration initiatives denote a slow evolution and a long and disjointed journey with scattered proposals and isolated experiences by government, civil society and private sector. A National Plan is needed to integrate ICT into the education system, in the framework of the national ICT Director Plan and relevant to the national reality.

The 1990s were characterized by a strong impulse to insert ICT in education through initiatives that were aimed at reducing the digital divide and improving the teaching and learning processes. The first training experiences in the use of ICT emerged in the country with a small group of teachers, from private institutions and Non-Governmental Organizations (NGOs), within the framework of the educational reforms of the 1990s, when facing challenges for mainstreaming ICT resources in the classroom.

Other initiatives, although isolated and scattered in time, come from the public sector, among them stands out the Institute of Higher Education “Dr. Raul Pena” with the incorporation of ICT as an instrumental component in initial teacher training for secondary education.

On the other hand, NGOs are key players in Paraguay, providing social services dedicated to the welfare of society, covering those needs that the State has failed to meet, and contributing to overcoming social inequalities. In this context, several NGOs dealing with education and technology are supporting the efforts of the Ministry of Education and Culture (MEC), and in partnership with international organizations, corporations and private companies, are developing ICT integration projects in schools, including components on teacher training.

These experiences have allowed teachers from various sectors, including remote rural and marginal urban areas, to have their first contact with ICT as an educational tool and for accessing information. Some outstanding initiatives are described below:

- i. Institute of Higher Education “Dr. Raul Pena”
- ii. EduTIC
- iii. ICT in the Classroom
- iv. Ñanduti Project
- v. One Laptop per Child
- vi. One Laptop per Teacher
- vii. Lights for learning

i. Institute of Higher Education “Dr. Raul Pena” (ISE)⁹

ISE was created by Decree No. 31.003, of January 16, 1968. As of May 7, 2001, it was recognized by Law as higher education institution N° 1692, entitling it to award Undergraduate, Graduate and Postgraduate degrees.

The ISE has taken root during more than 43 years, earning reputable academic and social status, as it has been devoted to training the largest number of people in the field of education, recognized for its academic excellence at the national, regional and global levels. ISE provides classes and virtual tutorials for specialization in Early Childhood Education, Information Technology, Educational Assessment, Institutional Management, and Inclusive Education. The ISE-virtual campus offers materials and activities to students to be used during the development of the courses.

ii. EduTIC¹⁰

The MEC has signed an agreement with the *ABC Color Newspaper* and *Third Millennium Foundation* to provide ICT training with a nationwide coverage. In this regard, the biggest newspaper facilitated

9. lse.edu.py (2013) <http://www.ise.edu.py/index.php/about-joomla>

10. Costa Bordón, María Cristina. «Caminos recorridos: Sistematización de los esfuerzos realizados por el Ministerio de Educación y Cultura en el período 1990-2010». Revista Paraguaya de Educación, MEC / OEI / Santillana S.A., Noviembre de 2012.

access to training for teachers of all levels, offering them a more flexible and autonomous route to enable a host of learning experiences in new technologies. The course's main objective is to support teachers in changing their teaching practices, including technology in their daily work by using new approaches in the teaching and learning process, while creating learning environments where students develop higher and critical thinking skills and significant learning.

iii. ICT in the Classroom¹¹

ICT in the Classroom is a distance learning training system created by *Última Hora Newspaper*, to collaborate in the improvement of education conditions. It is a free ICT course and has the authorization of the Directorate General of Higher Education of the MEC, and is aimed at teachers of all levels, managers of educational institutions and educational team members. The training covers the use of ICT for working in the classroom to innovate and make motivating classes for the students.

iv. Ñanduti Project¹²

Ñanduti Project is an online training course for math teachers at the secondary level. It was designed by the OEI and it is accessible to all the Member States in order to assist in teacher qualification programs of each country. The course is performed by the Organization of Ibero-American States (OEI) in its Center for Higher Studies in Education (CAEU) and is a joint collaboration with the Spanish Agency for International Cooperation and Development (AECID), established in order to support the construction of the Ibero-American knowledge through the promotion of scientific skills and abilities. The Paraguayan MEC and the Spanish Ministry of Innovation, Science and Creativity of the Government of Andalusia collaborate

11. Costa Bordón, María Cristina. «Caminos recorridos: Sistematización de los esfuerzos realizados por el Ministerio de Educación y Cultura en el periodo 1990-2010». Revista Paraguaya de Educación, MEC / OEI / Santillana S.A., Noviembre de 2012.

12. --

with this project. There are 300 secondary level teachers and 100 higher education level teachers participating.

v. One Laptop per Child¹³

The NGO *Paraguay Educa* runs the 1-to-1 model through the One Laptop Per Child Project (OLPC) in Caacupe, a city that is 55km from Asuncion. All of the schools in Caacupe, around 33, are participants of the Project and Internet connection has provided to the entire city. Within this project there are more than 450 school teachers and trainers that participated in several ICT trainings before the project started and during the project as continuous training. 9,000 students from primary level (1st to 9th grades) have benefited from the Project.

Paraguay Educa with authorization of the MEC, provides ICT training to all the teachers of the Project in the 33 public and private schools of Caacupe. This consists of a comprehensive training, which includes digital literacy and the integration of ICT as a tool in the classroom. The teacher is trained to apply the curriculum and lesson plan as an institutional classroom project. All of the training is based on collaborative learning and the philosophies of Jean Piaget and Seymour Papert of “learning by doing”.

Currently all 453 teachers at the primary level are part of the initial and continuous training course. Caacupe is the only city in Paraguay with the 1-to-1 model in all schools and with internet connection available in all the institutions and public spaces.

vi. One Laptop per Teacher¹⁴

Within the framework of the *2024 National Education Plan*, and according to the ICT Policy Implementation guideline for the Paraguayan educational system, the MEC promotes the “One Laptop per Teacher” to support the process of effective use of ICT by pub-

13. Paraguay Educa (2012): www.paraguayeduca.org

14. Costa Bordón, María Cristina. «Caminos recorridos: Sistematización de los esfuerzos realizados por el Ministerio de Educación y Cultura en el periodo 1990-2010». *Revista Paraguaya de Educación, MEC / OEI / Santillana S.A.*, Noviembre de 2012.

lic school teachers and thereby improving their performance. The idea is to use this tool to support their administrative and classroom tasks and enhance their teaching strategies through the integration of digital tools and resources.

The Project aims to benefit the 70,000 teachers in the whole country, and currently there are 33,000 beneficiaries. The training system is conducted in the following ways: a) the company that provides the laptops provides a laptop and a set of CDs for digital literacy and on-line support to each teacher b) distance training through television once a week with a specialist of the MEC c) online follow-up through the “Paraguay learns” platform.

vii. Lights for Learning¹⁵

Lights for Learning, is an OEI project that aims to provide electricity through solar panels and computers with the appropriate satellite/telephone internet connection in more than 66,000 schools in the Ibero-American region over the next 3 years. In Paraguay, there are around 160 schools in this condition.

Teachers in Paraguay are being provided with training in ICT and educational resources for innovation in the classroom. This component will result in the improvement of quality in public education, which will provide students the tools to face the challenges of today’s society.

Currently there are 12 schools participating in the program and around 15 teachers and received training in the use of ICT. The training is done in three ways: firstly, there is basic digital literacy training at the school when the teacher receives the computer. Secondly, there is group training with other teachers that are also in the Project, and the training is focused in the use of ICT in the classroom. And thirdly there is a follow-up and back-up training on-line and some visits to the schools to reinforce the training.

15. *Luces para aprender*: www.lucesparaaprender.org

5. Analysis:

ICT Integration and Initiatives

that contribute to providing learning opportunities to marginalized groups

In Paraguay, most of the initiatives that contribute to providing learning opportunities to marginalized groups through the integration of ICT are given a boost from the private sector, NGOs or international organizations. Although supported and or endorsed by the government, these initiatives emerge as a response from civil society to improve the lives of people who are in vulnerable situations: indigenous, rural, and disabled, among others.

- i. One Laptop Per Child (OLPC)
- ii. Lights for learning
- iii. iii. PAIDEIA Education and New Technologies
- iv. iv. Community Technology Center (CTC) OGUATAVA
- v. v. TIGO in Your Community

i. One Laptop Per Child (OLPC)¹⁶

The OLPC project implemented by *Paraguay Educa* bases their training and concept of education quality on the constructionist model. As mentioned above, the teacher training is also based in this model and in performing collaborative activities in the classroom with students.

OLPC in Paraguay provides ICT to marginalized groups: children in rural areas and there is a special program for *students with disabilities*. In the City of Caacupe, where the project is implemented, there is a school for students with disabilities, with classroom for all the kids of different ages and disabilities.

16. All of the information on this page is taken from: Ruiz, Olinda (2012). "El Entorno Sugar y el Desarrollo Cognitivo según Jean Piaget" (not published, available in pdf)

Before the OLPC Project, very few children with disabilities attended school, since the city does not offer transportation accessibility for people with special needs (especially those in wheel chairs). The sidewalks do not have ramps, the public transportation is poor, and no buses are adapted for wheel chairs. With this situation, *Paraguay Educa* arranged to donate to the government of Caacupe a special bus to transfer the students with disabilities that would need it in order to go to school and study every day.

The classroom was also adapted to meet, in the best possible way, all of the kids with different disabilities. Teachers worked with *Paraguay Educa* to develop an education method using ICT for these students. In this regard, *Paraguay Educa's* staff elaborated a special manual for using ICT as prosthesis for the different needs. This idea emerged from Seymour Papert's idea of using computer prosthesis to replace or amplify the sensory, motor or mentally damaged functions. These prostheses are not only computers but can also be the programs that are used with them.

The objective of the development of the manual is to view child development according to Jean Piaget's idea, as a guideline for teachers, in which they can identify at what stage the student is disabled and what is the ability to be stimulated later. The manual aims to stimulate skills using the activities of the Sugar learning platform. They were selected not to be used as a recipe, but suggest a different view of classroom work, which focuses more on skills and less on content.

The process consists of 3 steps:

1. *Identify the period of the child's cognitive development.* This is detected through observation and working with the materials of the Inclusive Education Directorate of the MEC, and then a psychological assessment is conducted.
2. *Stimulate learning through Sugar Environment activities.* Sugar Environment activities are classified by stages and play the role of showing the teacher how to use the activities for the de-

velopment of skills for the children with disabilities. Each stage can be stimulated with the activities of the manual or new activities; all depends on the creativity of the teacher.

3. *Periodically evaluate the child's progress.* Ensure that the activities used for the child are genuinely stimulating learning and are chosen properly.

ii. Lights for learning¹⁷

Lights for Learning was initiated in the framework of the *2021 Educational Goals: The Education we want for the bicentennial generation*, approved by Heads of State and Government at the XXI Ibero-American Summit celebrated in Asuncion, Paraguay in September 2011. Lights for Learning emerges from the belief that electricity is a key factor in ensuring the basic conditions for education and to enable the use of information and communication technologies (ICT). In today's information society, the lack of connectivity is a factor of marginalization and inequality.

The project will especially target indigenous and afro-descent populations, and will guarantee teacher training, sustainability of the initiative, and community engagement. In Paraguay the schools that have no electricity are all indigenous schools, and there are around 160 of them in total.

The Project Components of Lights for Learning in Paraguay are as follows:

1. *Technological Component*

This component covers the installation of a photovoltaic module (solar panels) in each selected school, and the delivery of at least one computer per school (with a large flat screen or projector). Connectivity is the central component of the project. When given an internet connection, students, teachers and community members will be in touch with the world and begin to break the communication

17. *Luces para aprender*: www.lucesparaaprender.org

barriers that prevent access to the information and communication society.

2. *Teacher Training Component*

Teachers will be provided with training in new technologies and educational teaching resource innovation for classroom implementation. This component will result in the improvement of quality public education that will provide students the tools to face the challenges of today's society.

3. *Community Involvement Component*

In order to ensure adequate participation and ownership of the initiative, awareness raising activities will take place in the communities. The idea is to transform the school into a meeting place for community participation by hosting cultural, literacy, leisure, and training activities via the internet. In Paraguay the Project also provides a vegetable garden for the community, in order to ensure a varied and healthy diet for these poor communities that sometimes they do not have much food.

4. *Educational resources*

The OEI in partnership with MEC and other organizations, provide to each school pedagogical digital resources, books, encyclopedias and textbooks for each grade of the school.

The program will be maintained over time through the ownership of the new technologies and educational resources not only by the teachers, but also by the whole community. Youth will be trained in the maintenance of the solar panels, thus contributing to the sustainability of the initiative and the creation of alternative sources of employment.

iii. PAIDEIA Education and New Technologies¹⁸

PAIDEIA Education and New Technologies is a private, independent, nonprofit organization dedicated to scientific research, promotion and teaching of sciences related to computer education. This organization promotes human development through innovative proposals in the field of education and ICT. The organization reaches inland schools with the “SchoolWeb” initiative. Computer labs are installed at each school, which serve as a “community technology center”.

During the school year, students come to their teachers. After school hours and days without school classes the lab is open to the community. The address of the educational institution and the Commission on School Parents are responsible for the center. PAIDEIA provides seminars, courses and workshops for teachers; also training and updating of primary, secondary, and higher education teachers.

iv. Community technology center (CTC)

OGUATAVA

OGUATAVA (meaning “walking” in Guaraní) is a bus equipped with 17 computers traveling through the country carrying Internet, citizen information, E-Government, blogs, online radio and video conferencing to the neighborhoods, schools, colleges and rural communities with the objective of raising awareness and providing digital literacy to the Paraguayan citizens. This service enables training activities for children, adolescents and teachers in different educational communities throughout the country, according to educational policies established by the MEC.

18. NGO PAIDEIA, WebEscuela.edu.py (2010): <http://www.webescuela.edu.py/>

v. TIGO in your community

TIGO is a regional mobile phone company that has offices in Paraguay. TIGO recognizes that education is a strategic tool to contribute to sustainable development and improving the quality of life. In this framework, it has led efforts to work in two major fields: the quality of education and the effective incorporation of ICT in schools to achieve significant changes in the educational system of Paraguay.

TIGO in Your Community is a Social Responsibility project of TIGO, in partnership with the MEC, which seeks, through technology, to improve the quality of education. The project provides a “container classroom” with 10 computers, furniture and free internet access to the beneficiary schools. It also provides training services for the proper use of these resources, with the ultimate goal that teachers use the technology for their administrative and classroom work.

The project began in 2011 and it aimed to benefit - in a period of three years - 100 schools. These schools will also experience an educational intervention and ICT training for students and teachers of the schools, and also will provide activities for the whole community. The purpose of the program is to improve student learning and teacher learning management through the use of technology. The program places special emphasis on teacher training in the use of ICT, whose ultimate goal is that teachers use technology for teaching processes

Senegal

The Integration of ICT into Education and Training in Senegal

by Claude Lishou

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1. Description of the Education System

Senegal is one of the countries whose objective is to achieve EFA by 2015. The education system in Senegal comprises two sectors:



- **Formal education** covers pre-school, primary, middle and high school general education, technical education, vocational training and higher education. In recent years a private education system has developed alongside the public sector system.
- **The non-formal** education sector covers literacy programs, basic community schools and “schools of the 3rd type”. The latter two categories are experimental.

The education system is structured in a series of levels (Table 1): each level has a particular type of educational establishment.

- The “*case des tout-petits*” (kindergartens) for very young children,
- Nursery schools for preschool education,
- Primary schools,
- Middle schools for intermediate level education,
- High schools for secondary education,
- Universities for higher education.

Table 1. The structure of Senegal's education system

Levels	Duration of studies	Student/pupil age range	Observations
Early childhood	3 to 6 years	0 to 6	
Pre-school education	3 years	3 to 6	Entry is possible from age 2 ½
Primary school	6 years	7 to 12	
Middle school	4 years	13 to 16	* age 13 - 14 (1st and 2nd years): observation period * age 15 -16 (3rd and 4th years): orientation period
High school	3 years	17 to 19	(final three years at secondary level)
Higher education	Variable, according to course and type of education	Follows on immediately from secondary level	

Source: DPRE

2. Senegal's Education System: Principal Indicators and Challenges

Ranked 20th of 28 countries in the African EFA monitoring report by UNESCO (October 2012), Senegal does have two substantial advantages where education is concerned:

- i. It has been able to prioritize education in its public expenditure, devoting 41.1% of total current expenditure to it, the highest figure in Sub-Saharan Africa;
- ii. Gender parity has been achieved or even exceeded (for every 100 boys completing primary schooling, 104 girls complete this level).

However, although school coverage has been improved, Senegal's school enrolment figures remain lower than average for the continent. The country has still not achieved universal primary school enrolment and half the population is still illiterate. There is however room for improvement in intra-sectoral allocation of resources and their use and this may facilitate achievement of EFA targets.

Youth (age 15-24) literacy rate (%), 2007-2011*, male	74
Youth (age 15-24) literacy rate (%), 2007-2011*, female	56
Number per 100 population 2011, mobile phones	73
Number per 100 population 2011, Internet users	18
Pre-primary school participation, Gross enrolment ratio (%) 2008-2011*, male	12
Pre-primary school participation, Gross enrolment ratio (%) 2008-2011*, female	14
Primary school participation, Gross enrolment ratio (%) 2008-2011*, male	84
Primary school participation, Gross enrolment ratio (%) 2008-2011*, female	89

Primary school participation, Net enrolment ratio (%) 2008-2011*, male	76
Primary school participation, Net enrolment ratio (%) 2008-2011*, female	80
Primary school participation, Net attendance ratio (%) 2007-2011*, male	60
Primary school participation, Net attendance ratio (%) 2007-2011*, female	63
School participation, Survival rate to last primary grade (%), 2007-2011*,	60
Primary school participation, Survival rate to last primary grade (%), 2007-2011*, survey data	93
Secondary school participation, Net attendance ratio (%) 2007-2011*, male	35
Secondary school participation, Net attendance ratio (%) 2007-2011*, female	32

Source: http://www.unicef.org/french/infobycountry/senegal_statistics.html#103

Despite sustained effort by the government, which has resulted in a significant improvement in the performance of the education system, inadequacies due on the one hand to very limited access to education and limited efficiency and effectiveness within the system, and, on the other, less than rational organization and management, are serious impediments for the development of Senegal's education system.

Every phase of the Ten-Year Education and Training Program (PDEF) has been instrumental in achieving results and providing a coherent framework for all the activities conducted in the sector up to 2008. Its implementation has focused on a reinforcement of the system, prioritizing basic education, technical education and vocational training.

In connection with the operationalization of the Ten-Year Education and Training Program (PDEF) and following the adoption of the letter on general policy for the education sector over the period 1999-2008, updated by the letter on sectoral policy in Senegal in 2005, a number of initiatives and measures have been implemented

to improve the quality of the education system. Among them, the following are noteworthy:

- Definition of a new educational program (Curriculum for Basic Education (CEB), and Skills-Based Approach (SBA) to teaching),
- The addition of the national languages,
- The addition of French-Arabic schools to the system,
- The addition of religious teaching at elementary level,
- The school manual publication and distribution policy,
- Generalization of free provision of school supplies,
- The policy for systematic implementation of School Projects,
- Experimentation with the introduction of New Information and Communication Technology (NICT) in basic learning (written and spoken French, mathematics),
- The “reading at school and in the home” initiative,
- The creation of multigrade classes,
- Experimentation with, and extension of the single grade school model,
- Extension of teaching initiatives such as Harmonized Progression and Standardized Evaluation,
- The introduction of formative assessment strategies in elementary school,
- The creation of concerted pedagogical action zones such as the Education Project for the Dakar Suburbs (PEBD) and the inter-education authority cooperation zone funded by UNICEF, grouping together the Kolda, Ziguinchor, Tambacounda and Matam education authorities.

In 2013, as a replacement for the Ten-Year Education and Training Program (PDEF), Senegal’s government chose to structure its new education policy around action by local government authorities and grassroots actors in order to reinforce the decentralization and regionalization of public policy. The new sectoral program, entitled “Program for Quality, Equity, and Transparency Improvements in Education” (PAQUET) covers the period 2013-2025.

In the new program the local level is of strategic importance for a refounding of the education and training system. Devolvement and decentralization of the management of the education and training sector continue to be key options to provide greater freedom for initiative and responsibility on the part of local government, as well as more autonomy for schools.

To that end, specific strategies have been defined for the various sub-sectors of basic education, general high school education and vocational and technical training with the aim of providing enhanced leadership and empowerment in local government. Various implementation instruments have been defined, in addition to effective availability of resources, to permit local authorities to manage the system's various levels.

The Program's structure provides for three phases (2013-2015, 2016-2020 and 2021-2025). Each phase will be covered by a milestone evaluation, adjustments being made where necessary. For example, the end of the first phase coincides with the deadline for achievement of the Millennium Development Goals (MDGs), whose realization will be assessed and a new global development program put in place by the international community.

For the government of Senegal, the vision and priorities defined under PAQUET are totally in line with the results of the Global Thematic Consultation on Education in the Post-2015 Development Agenda.

For 2013-2015, the total budget is estimated at approximately FCFA 2,000.200bn, 89.29% of which will come from domestic resources (central government, local authorities and households). During this initial phase, central government will finance 90% of the cost of the action plan in 2013, 88% in 2014 and 84% in 2015. However, with the contribution from donors of 223.890bn, an annual gap of 8bn needs to be found to complete the funding.

3. The Current Position of ICT in Senegal

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
%	0.40	0.98	1.01	2.10	4.39	4.79	5.61	7.70	10.60	14.50	16.00	17.50	19.20

Percentage of Internet users [1]

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Mil- lions	0.25	0.3	0.5	0.78	1.1	1.7	2.9	3.6	5.3	6.9	8.3	9.3	11.4

Numbers of mobile telephone subscribers

- Number of landline telephones per 1,000 population = 26 (2011)
- Number of mobile telephones per 1,000 population = 880 (2012)

LANDLINE TELEPHONY (ARTP, 30 June 2013)	MOBILE TELEPHONY
<ul style="list-style-type: none"> • 2 operators: Orange and Expresso • 342,400 subscribers • 1,812 public lines • Penetration: 2.53% 	<ul style="list-style-type: none"> • 3 operators (Orange, Tigo and Expresso) • 12,661,913 subscribers • Penetration: 93.06%
INTERNET	
<ul style="list-style-type: none"> • Bandwidth: 12.4 Gbps • 2 ISPs (Orange and Arc Informatique) • 396 leased lines • 1,220,738 Internet subscribers • 973,682 2G+3G subscribers (79.08%) • 108,915 Internet USB keys (8.9%) • 100,345 ADSL subscribers (8.2%) • 37,716 PSTN subscribers (3.1%) • Penetration of Internet services: 9.02% • 2,269,681 Internet users • Penetration: 17.5% of the population 	

The ARTP has issued its quarterly report on the telecommunications market in Senegal. This document gathers together all the available data on the telecommunications market for the April-May-June 2013 calendar quarter. The figures in this report are provided to the ARTP by the various actors in the market.

Senegal's population was estimated at 13,527,020 in 2012 and this figure is used as a basis for all the calculations and results shown above. The operators active in Senegal are Orange, Tigo and Ex-presso.

4. The Current Position of ICTE in Senegal

In Senegal, ICT use has always been a policy option very clearly expressed by government since independence. The introduction of this technology in education is the outcome of three factors:

- the international context of ICT development,
- the education policies applied by central government in Senegal,
- the local context of ICT development.

Indeed, from 1960 to 2011, ICT use and its integration into the education system have developed as a function of education policy and the context of ICT development both locally and internationally.

It is thus possible to describe the phenomenon in terms of three phases:

The first was a “long experimental phase with patchy results” from 1960 to 1980. On gaining independence, the government of Senegal made known its political determination to make use of ICT in the education system. This led to the introduction of the “*Pour parler Français*” method from the Dakar Applied Linguistics Center (CLAD) based initially on the use of radio (1964), and later on school television (1978) with the setting up of the Directorate for School Radio and Television (DRTS). Although school television programs turned out to be effective to some degree, this was not true of radio. It was condemned by the General Conference on Education and Training (now EGEF) in 1981 and no evaluation of these projects have ever been carried out.

The EGF put forward recommendations on ICT for the education system but this did not lead to any implementation in the curricula. The Structural Adjustment Policies which imposed drastic bud-

get restriction measures on central government led the education system into a downward spiral of structural crises which were not conducive to this often costly type of project. Nevertheless, private initiatives led to the development of a number of projects with the goal of making ICT an integral part of schooling: the LOGO (1982) and PIISE (1989) projects based in the Information Technology-Education Laboratory at the ENS national teacher training school, the first to attempt to introduce computer use into teaching and learning. There was never any official evaluation of these projects and they were never followed up. Where telecommunications are concerned, Senegal saw major progress in both access and cost with the setting up of the Senegal national telecommunications company (SONATEL). In this connection, incentive measures were initiated by SONATEL for the benefit of Senegal's Ministry of Education.

It was in the late 1990s that we saw the massive introduction of computers in the education system:

- the School IT Generation (GIS) project, launched by a private body in partnership with the Ministry of National Education,
- the Word Link Development program with the World Bank, fostering the introduction of the Internet in secondary schools,
- the Population Study and Education Group (GEEP) with support from the CRDI, which implemented the project for the creation of Young Cyber Spaces in middle and high schools.

Since 2000 striking progress has been visible, due in part to a more assertive political will underpinned by a favorable international context.

In addition, Senegal had set up a Ten-Year Education and Training Program (PDEF). The general strategies for implementation of this plan clearly stipulate the extension of the application of the new technology in terms of the following:

- Internet connections for schools,
- Development of the teaching of IT,
- ICT use as a means for improving teaching/learning processes,

- ICT use for the management of establishments seeking enhanced quality,
- Definition and implementation of a master plan for the sector's information system.

Additionally, the international context in the 2000s was characterized by the development of the World Wide Web, which acted as a catalyst for Internet use, opening up highly positive prospects for the education and training sector. ICT access improved greatly at the local level.

It is undeniable that the government of Senegal has made constant effort, with real achievements, from which the education system has benefited. Those efforts can be summarized as follows:

- The setting up of bodies with ICT management responsibilities: the Ministry for ICT, CIME, ADIE, COMNITICE, and so on.
- The modernization of the government's system of management: the government intranet.
- Initiatives for projects with a focus on the education system: SENECLIC, SANKORE, EDB/TIC, TEAM 9,
- Partnership with the private sector for ICT access at preferential rates.

The creation of the Digital Solidarity Fund whose management board is currently based in Senegal, was a major step in the effort to make ICT a lever for development. And in fact the Strategy for Accelerated Growth is reliant on ICT for the creation of 300,000 jobs. Indeed, numerous initiatives have been deployed in the field.

Initiatives for ICT introduction in the education system

From preschool to higher education, it is evident that considerable effort has been made, to varying degrees, on ICT introduction: substantive projects have been set up and implemented in elementary and middle schools.

At the elementary level, the SENECLIC project, which answers directly to the office of the President of the Republic, is charged with the task of equipping primary schools with technology rooms and training teachers in the use of digital resources. Alongside this, the SANKORE project, which is headed up by the Ministry of Education, is currently in its trial phase for the use of Interactive Digital Blackboards in 350 classes.

In 2011, the GENAF project contributed to the educational and cultural development of the rural community of N’Gogom and to meeting major needs for school infrastructure at secondary level. This was needed because the rural community of N’Gogom has 41 villages but just one secondary school for all 1,400 pupils. The latter are divided into 21 classes, and up to that point the school could only take 14 at the same time. A system of class rotation was put in place in order to provide a maximum of education for all pupils but it was nevertheless impossible to cover the whole of the school program.

In addition to constraints related to infrastructure, the school is also directly affected by its distance from major urban centers and teaching resources are in short supply there. Faced with this state of affairs and with the support of the town of Malakoff, in decentralized cooperation with the rural community of N’Gogom, GÉNAF designed a project to remedy the lack of education infrastructure by building two classrooms equipped with digital teaching material and documentation. However, GÉNAF projects are always accompanied by educational and cultural programs to match the needs of individual children in order to supplement the scheme by adopting a more direct approach to benefit children and develop closer links with the local population.

In generalist middle schools, the USAID/EDB/TIC (USAID/Basic Education/ICT) project is conducting a wide-ranging program to equip and connect 408 secondary schools in the country and to train teachers in making ICT an integral part of their teaching methods.

In higher education, ICT is driven by a significant dynamic for integration through numerous projects for:

- equipping students with laptops at preferential prices,
- easy Internet access on campus by creating partner digital campuses in university libraries,
- the setting up of the African Virtual University (AVU) to train teachers in using communication technology in their teaching,
- the setting up of a distance training scheme in the Faculty of Science and Technology, Education and Training (FASTEF).

It must be said that while there is undoubtedly a great deal still to be done in higher education, the many initiatives that have been launched augur well in the short term for judicious use of ICT in meeting the enormous challenges facing university education in Senegal.

There are also other projects initiated by private bodies and partner organizations (CYBER-SMART AFRICA, British Council) which are developing cross-cutting programs at all three levels, elementary, middle and secondary.

An overview of ICT projects in education (2011-2012)

1- Early childhood

The “*Case des tous petits*” kindergarten experiment is to equip them with ICT in order to familiarize the children with IT tools.

In 2010 there were 427 “*Cases*” across the country. The IT dimension is structured around discovery materials in multimedia form, e.g. CD-ROM, DVD and freeware.

2- Elementary education

The design of a new curriculum for basic education has to an extent included ICT skills for mathematics, science and languages such as French and English.

The INEADE experiment

This unusual experiment was conducted in Serigne Amadou Aly Mbaye school in Soumbédioune by a team from INEADE in conjunction with the Education Reform Observatory (ORE). Conditions for ICT integration were put in place to equip two “experimental” classes.

The Sankoré project

equipped 350 classes with education technology made available to the Ministry of Preschool, Elementary and Middle High School Education, and of National Languages in Senegal.

The SENECLIC project

Since this has been set up, the SENECLIC team has installed seventy-three (73) multimedia rooms in elementary schools in the region of Dakar, Thiès, Diourbel and Louga.

3-Middle and secondary schools

This is the priority domain for deployment of ICT projects in the education system. Of all the projects and programs that have helped equip schools, other than those already mentioned, we will single out the following here:

The NEPAD e-school

Program for equipping and connecting 6 high schools in various regions of Senegal, including high schools in Bargny (Dakar), Niakhar (Fatick), Aline Siteo Diatta (Ziguinchor), Dahra (Dahra), Ibou Diallo (Sédhiou), Waounde Ndiaye (Bakel) based on a model to be trialed.

USAID/EDB

Through its ICT component, has equipped 408 secondary schools and over 10 Daaras by providing them with a minimum package comprising a laptop, a video projector, a server with digital resources and a digital video camera to allow pupils to do their work successfully by means of collaborative projects.

TEAM 9

This program includes eight African countries (Burkina Faso, Chad, Côte d'Ivoire, Guinea Bissau, Mali and Senegal) plus India – hence the figure “9” in the title. This has equipped the following in Senegal:

- 99 high schools across the country's 14 regions. Each high school is provided with 20 computers with the exception of John F. Kennedy, Lamine Guèye, Limamoulaye and Blaise Diagne. This project is conducted by the Ministry with responsibility for education.

GEEP (Population Study and Education Group)

This is aimed, in conjunction with the government and other actors in the education sector, at fostering the introduction and generalization, or indeed the popularization, of ICT as a tool for the transmission of knowledge as well as an area of knowledge in itself.

The strategy adopted by the program is based on a dual-lever mechanism: “population teaching” and ‘Family Life Education’ (EVF) clubs set up to bring the problems of the general population into the classroom, and into the heart of teaching activity, and to seek to follow them up in socio-educational activities.

Microsoft: Partners in Learning (PIL)

Partners in Learning is an educational partnership program offered by Microsoft to all governments, to their organizations with responsibility for education and their national and international partners.

Launched in 2003, Partners in Learning is based on the concept of corporate social responsibility.

Community Multimedia Centers (CMC)

have contributed to the spread of ICT in local communities. They were among the first partners for schools. All middle schools have a management committee on which members of the local community and parents of pupils sit. In 2009, 27 centers were set up across the country with the help of Swiss cooperation, UNESCO and the SONATEL Foundation. 700 individuals have been trained.

4- Higher education

In the Universities and Regional University Centers (CUR) where open distance training (FOAD) has become imperative, various training courses from renowned European, Asian and American universities are provided, notably at UCAD Dakar and UGB Saint Louis.

The African Virtual University (AVU)

Since it opened its doors, the African Virtual University has introduced distance teaching to Africa, set up 55 centers and trained over 40,000 students, more than 100 technical coordinators and several academics.

Courses are provided with ICT integration in mind in partnership with the USAID/EDB project.

Projet SNRER

The specific objectives of the Senegal Network for Higher Education and Research (snRER) are:

- **to build a digital communication infrastructure for higher education and research**, interconnecting the national scientific community with the Education and Research networks at regional and international levels,

- to promote mastery of tools based on Information and Communication Technology (ICT) for optimum use in higher education, research, vocational training, governance, management and the administration of archive and document resources,
- to contribute to the development of research and the supply of training by making available new education technologies in a generalized digital working environment.

The strategic options for universities are as follows:

- improvement of the level of ICT use in teaching strategies,
- identification of ICT-related projects as having priority importance in universities' performance contracts (CDPs),
- development of ICT for improved institutional governance and management,
- development of distance teaching systems in order to remedy the lack of staff and improve teacher/student ratios.

This national interconnection network needs to be backed up by two other bodies:

- A National Information System (SNI) shared by higher education establishments and the relevant ministry for use in university administration;
- A Technology and Teaching Resources Center (CRTP) for the provision of a quality system for higher education with ICT support.

The UCAD IT calculation center

Distance learning has assimilated the digitization and staging of lessons, the posting of material on line and e-learning tutorships. Distance training courses have been implemented in partnership with the AVU for teachers and e-learning platform administrators.

The Senegal Virtual University

The second aspect that highlights the strong ICT presence in higher education in Senegal is the impetus it will gain from the opening next December of the Senegal Virtual University which will be

reliant on Digital Open Spaces (ENO) and which already possess buildings with over 200 computers connected to the Internet plus videoconferencing rooms. These Digital Open Spaces will enable students to follow lessons, carry out practical work and undergo evaluation.

The SVU, which is part of the *Open Universities* dynamic, will be commencing its teaching in January with five degree courses: English, Sociology, Legal and Political Sciences, Economics and Management, in addition to Applied Mathematics and Information Technology.

5. ICT in Training Programs

If ICT is to be used effectively in education, it will be necessary to establish a program of training. This is a minimum program enabling schools to arrive at genuine integration of ICT into teaching methods (UNESCO, 2004). The program targets not only pupils but also their teachers.

Recent studies to which we have had access show a middling level of ICT integration (35%) for pupils. If we analyze in depth the figures for this integration, we can see that they are a consequence of the level of literacy. In other words, it would appear that the level of integration can be high only if the level of literacy is already high. There is therefore a correlation between the level of integration and the level of computer literacy. In light of this analysis, we can put forward a hypothesis that if there is no sustained literacy program in high schools, there is little chance of success in making ICT an integral part of the teaching.

The integration of education technology into teaching and learning is also governed by a number of prerequisites. For example, for a successful integration process it is important to take into account the infrastructure dimension. Technical infrastructure (i.e. an IT room, electrical power supply, an Internet connection), IT equipment (computers, CD-ROM, freeware and accessories) and financial resources are in our view prerequisites.

Technical and professional support are also necessary if ICT is to be made an integral part of education. The availability of qualified staff to support the process is key here. Sufficient financial resources for the maintenance of the equipment are also a prerequisite for ICT integration. In Senegal, although many high schools do in fact have an IT room and an Internet connection, there are often issues with the continuity of the connection and power supply.

Access to education technology in secondary education can offer a wide range of possibilities to enhance the effectiveness of the learning and teaching processes. Ideally, the use of computers and the Internet for teaching and learning can enrich the learning environment for pupils and provide teachers with a useful teaching resource. Whatever the issue – support for the use of ICT, availability of computers or the place where the computers are available for use – ICT access is an imperative condition to be met for the efficient use of this technology.

Generally speaking, all the computers in secondary schools in Senegal are in the IT room rather than in the usual classrooms. This situation has the effect in some cases of making computer access problematic. Access is more important than numbers per se of computers on site and the type of ICT equipment made available. Internet access outside normal class hours enables pupils who have no other access to the Internet to use it for school activities such as the consultation of documentation to produce better informed classroom presentations.

It can frequently be seen to be the case that in IT rooms pupils browse the web alone. The disadvantage of this is that when they are left to their own devices with no supervision from a teacher or resource individual, they are tempted to simply “surf the Internet”, visiting websites other than those where they can find on-line learning resources. Most pupils use social networks such as Facebook to connect to the Internet and others simply make use of the recreational resources or the email functions.

Observation of the behavior of pupils in IT rooms has led us to note that Internet navigation is used more for recreation and play than for learning. This is standard practice in almost all educational establishments in the country. As an educator, this behavior with regard to ICT on the part of young people inevitably arouses a reaction in us. Faced with the phenomenal rise of social networks, we consider it necessary to take adequate steps and for example im-

plement filter systems in school IT rooms in order to avoid possible misuse. Consequently, the presence of an ICT resource individual to supervise pupils in each establishment is in our view the solution for avoidance of the risk of undesirable uses. It is useful in our opinion to set up websites in every high school to encourage the creativity of pupils and also to provide more information to their parents on school reports, parent-teacher meetings, in addition to their children's timetables, homework and examination calendar.

The use of on-line teaching resources is also a key factor in making ICT an integral part of education. The creation of a digital working environment can facilitate the sharing of teaching documentation between teachers and between pupils and teachers. This practice is rare in Senegal's high schools. However, survey results show that pupils are frequently on the web, as is confirmed by 82% of respondents. These results reveal a number of points common to all pupils in their use of the web: their curiosity in discovering previously unknown or imaginary worlds. They sometimes use the web without any precise learning objective in mind. Few of the pupils interviewed claim not to be attracted by the Internet. They see it more as a tool for "distraction" than as a teaching medium. But the question that everybody asks themselves is whether it is possible to make ICT an integral part of education if ICT is not included in school study programs?

In every high school in Senegal with an IT room, ICT is either recognized and taught as a school subject or used as a teaching tool.

Despite this, this new technology is not yet included in school study programs. This may explain why some teachers hesitate to use ICT.

There have now been several decades of effort and substantial investment in education technology but there is still a long way to go on the part of Senegal's government. Fortunately, today there are a number of projects for ICT integration into secondary education: the USAID/EDB project alone gives us hope that over the next few

years the education system in Senegal will be able to enter the era of digital education.

If we look at a few of the difficulties that explain this slow pace of integration, we can see that one of the first impediments relates to teaching resources: school supplies, teaching materials, learning materials, additional materials for collective use, school manuals designed for adaptation to ICT, learning material, educational software, tutorial software, digital educational content, on-line teaching and learning resources. These are the labels used to refer to educational, cultural and information resources that teachers can use to teach their pupils how to learn in the era of ICT.

6. ICT in the Management and Administration of Educational Establishments

The implementation of the government's Internet project is intended ultimately to offer special access to ICT to all sectors of education, to supply communication media and to make available to heads of establishments tools for administration and management and educational resources for vocational training institutions, in addition to services for government staff.

Senegal's public university system, which comprises five national institutions, has massively integrated activities involving the new technology. This commitment is visible at a number of levels. For the first time, a website has been opened this year for registration, pre-registration and course advice for high school leavers. This new on-line enrolment scheme for high school leavers will provide government and university with "total visibility" of higher education and individual students throughout their courses. Those awarded their high school diploma in 2013-2014 will be the first to use the system. They register on the site for admission to public- and private-sector universities. This innovation will ensure that the academic authorities have a national ID for each student, enabling their development to be followed throughout their university courses.

This use of pre-registration on line is not a novelty in Senegal given that Gaston Berger University started to use it successfully last year. Similarly, advice on university courses was put in place by central government in private-sector higher education. Prospective

students in Senegal can now request advice on the courses on offer in Senegal's universities; to date, 34,000 students have pre-registered. Student dossiers are built up entirely on line, quite simply and rapidly. The process is straightforward and is explained in the newspapers, along with the basic requirements to be met for the procedure.

7. ICT in Initial Teacher Training

Actors in the education system need to be convinced of the educational and vocational value of ICT. Teachers have a crucial role to play in this. School programs must include ICT if teachers are to be able to apply these technologies to teaching and learning processes. Do the programs now in force, as designed, offer an environment conducive to the use of ICT in teaching and learning in Senegal? Internet and computer use is increasingly frequent in Senegal's high schools. Despite this, many teachers still have difficulty in making them an integral part of their teaching practice.

Few teachers use ICT and even fewer make judicious use of ICT for teaching purposes. This is understandable insofar as they will have gone through initial training that has not been long enough to provide them with the required skills. But now that ICT is penetrating every sector of our lives, surely it is a core task of schools to train the main actors in the system in the pedagogical use of education technology? Is it conceivable that teachers are frightened by ICT?

In the survey that has provided material for this report, on the questionnaire submitted to secondary level teachers regarding their teacher training in ICT, 66.7% stated that they had received no initial training related to ICT skills. Conversely, 33.3% did say that they had been trained in ICT use. What is noteworthy in these results is that teachers also emphasized the importance of continuous training. They feel that it is just as important as initial training insofar as ICT is continuing to develop day by day.

Pupils' testimony was similar to that of the teachers: 68% stated that they had never received initial ICT training, compared with 32% confirming that they had received such training.

8. ICT in Continuous Teacher Training

The pedagogical training of teachers in ICT can be effective only if it allows teachers to adapt the technology to their professional practice in the classroom. A short period of training is meaningful only if it is followed up and supported by continuous training throughout the teacher's career. It can be seen to be important to use resource teams in each discipline or in each school and to make training tools or remote support available to teachers. What FASTEF does very effectively with supply teachers could be broadened to include all teaching staff outside Dakar. The priority must therefore be to enable teachers to make ICT standard practice in their teaching by mastering the technical use of the tools for their application in the classroom.

The testimony collected from teachers on continuous training virtually parallels that on initial training. Of all respondents, 61.1% stated that they had never had any continuous training during their career, compared with 38.9% asserting the contrary.

It would be desirable for a continuous training scheme in favor of development and consolidation of acquired skills to be set up to follow up on teachers in the area of ICT teaching skills. In actual fact, in order to improve the approach to pupils in a digital work environment, teachers need to develop the skills relevant to education technology. The EDB/IMED project will undoubtedly contribute to the further development of the ICT skills of teachers at secondary level.

The FASTEF initial and continuous training program should be capable of creating an interface with the realities on the ground in primary and secondary schools. It would be a useful initiative to draft a common set of reference criteria for the integration of ICT into teaching.

9. ICT and Marginalized Groups

Young people in Africa are a social group that is marginalized by the primacy accorded to their elders. This new tool, information and communication technology, must contribute to the emergence of young people as a driver for the information society integration process. This technology, in which the degree of expertise is often in inverse proportion to age, must contribute to a refocusing, or even a reversal, of social values. Surely ICT, due to the openness to the outside world that it provides, must highlight more sharply still the divide between youth and legacy societies that offer few or no prospects for the future? Surely ICT will deepen further the existing gap between young people plugged into cyberspace and adults connected to traditional society, or what remains of it?

The Literacy Project for Young Girls and Women (PAJEF) in Senegal
The PAJEF program began in January 2012 and targets a total of 40,000 illiterate and newly literate women in the 15 to 55 age range in Senegal. The seven regions most affected by illiteracy are particularly closely targeted (Diourbel, Fatick, Kédougou, Matam, Saint-Louis, Tambacounda and Dakar). The project will continue to the end of 2013.

The classes under the PAJEF program were designed to be given Sankoré Digital Classes (CNS). Two hundred digital class kits under the “Sankoré” program are the core of the joint partnership for education between the Public Interest Grouping for Digital Education in Africa (GIP ENA), the French Ministry of Foreign Affairs and the UNESCO Office in Dakar.

These digital kits are of use not only for teaching and learning in the case of illiterate young girls and women but also for supporting the

use of information technology by the 3,998 young girls and women who were helped to become literate in PAJEF's first phase.

ICT can become a reality in villages that are often isolated, using these digital kits, but a number of challenges remain to be overcome:

- inclusion of ICT in current teaching and learning programs,
- teacher training for this specific software and development of their teaching capacity,
- use of local languages in ICT.

The digital kits will also be installed in formal schools running literacy classes for use in both formal classes and literacy classes.

The inclusive INFJA ICT Project

The general aim of this pilot project (2013) is to provide blind pupils with the ICT skills to enable them to make an effective contribution to the information society by making ICT use an integral part of teaching and learning.

The project aims:

- to model a digital training space adapted to the blind,
- to develop a pilot digital space adapted to the blind at the Institute for Young Blind People in Thiès (INFJA);
- to make ICT an integral part of the education provided to pupils at INEFJA;
- to study possible applications for the public and private sectors.

The project will be set up at the National Institute for the Training and Education of Young Blind People (INFJA) in Thiès, the only public-sector body for the blind in Senegal. INFJA was founded in 1982 and has accepted pupils from the sub-region (Mali, Mauritania, Guinea Conakry) under inter-African cooperation. Several partners, including the OIF, have already invested in the rehabilitation of this establishment to provide decent living conditions to all the young blind or sight-impaired people concerned.

If we wish to build knowledge societies that are inclusive, access to information and knowledge is essential to all citizens to allow them to participate and become creative and productive members of society. ICT is therefore an effective way of reaching out to the disabled and improving their quality of life by offering them new opportunities in the field of education and employment and fostering their social inclusion and participation.

10. Digital Content for Education

Technical staff at the office for information and communication technology for education and the teaching of science at the Ministry of National Education are working on the development of an education portal website to bring together a body of teaching content. This tool will, it is felt in Senegal, help guide pupils and teachers towards teaching resources to be found on the Internet. This experiment, which already exists in higher education, is a welcome one given the increasing number of projects aimed at introducing ICT into the education system: the World Links for Development (WorLD) project or the traditional CRDI. There is also GEEP's CyberYouth Spaces project which is reliant on ICT to give another dimension to Family Life Education (EVF).

The Free Resources for African Primary School Teachers (Reli@), which organized the first pan-African workshop on the sharing of experience and the building of free digital teaching resources in Dakar at FASTEf (formerly the ENS, or teacher training college), has published a statement – the “Dakar Declaration” – strongly advocating the pan-African production of free digital teaching resources.

This workshop, which was attended by eminent specialists and researchers in education and ICT, teachers, trade union representatives, companies and education projects, resource-individuals from the ICT world, from Burkina Faso, Cameroon, France, Mali and Senegal, welcomed the high level and substantive character of the discussions on the potential opportunities offered by the bodies of expertise, systems and resources available and immediately deployable for the improvement of the quality of learning and access to education in the French-speaking countries of Africa.

The Gaston Berger “Jardin des Arts” [Garden of the Arts] association and the University of Saint-Louis have announced that they have drafted a project proposal entitled “Les contes de l’éducation” [Stories of Education], with the aim of building teaching content based on information and communication technology.

The objective of the project is to create teaching content for computers, to publish material, to create digital material that can be downloaded from the Internet, in compliance with copyright and intellectual property rules rights held by various actors, notably pupils.

The document describing the project states that this content relates to various focuses for development such as ethics, health, protection of the environment and cultural and social life. The project’s authors assert that they are “aware that all improvements in the quality of teaching must involve improvements in the use of communication technology”. The “Jardin des Arts” has conducted a program of work involving tours in four primary schools in Saint-Louis over a period of three months, spending two hours a week in each school in 4th grade/Year 5 primary classes.

The document relates how the members of the association supported pupils in writing and plastic arts workshops, using the 10 words of the Francophonie, to create a book of illustrated stories.

The aim will be to tell stories that encourage development of pupils’ self-expression in French and to make use of the students’ talents by posting them on line. The stories will subsequently be marketed on different media.

As the text explains, the use of ICT will make it possible in this way to spread knowledge by means of play, to inculcate values, to get messages across on various media such as the computer or the mobile telephone, items which no young person today is without. These media allow applications to be downloaded from the Internet.

The inclusion of Gaston Berger University in this project ensures its ongoing development over a number of generations, adhering to the texts and documents already in place. It will also be necessary to seek to ensure the formation of a dedicated team for internal management, comprising among others representatives from the IT and information graphics departments (teachers, supervisors and students). The project is in this way a contribution to the policy for the creation of jobs for young people and the policy for combating illiteracy. It must ultimately contribute to the development of the digital environment, while at the same time encouraging improvement of the mastery of the French language by the schoolchildren involved.

11. Conclusion

Senegal has substantial advantages where both digital and analogue communication infrastructures are concerned. The country has good media coverage: radio and television broadcasting, mobile telephony and broadband Internet. However, there is disparity of access to IT and electrical power supplies between the major urban centers and rural areas. This divide is more striking in the education sector, and more especially in the elementary sub-sector, in which most schools are out in the countryside, with no electricity supply. Nevertheless, there is a political will to narrow this digital, energy (and educational) divide between the various levels of the education system irrespective of the location of the establishment concerned. This is a matter of equity for public-sector schooling. All kinds of initiative have been undertaken to reduce the gap and promote ICT use by both teachers and pupils in order to improve practice and performance.

ICT can be effectively made an integral part of national education systems only with an intelligent mix of the following policy and operational measures:

- Clear objectives and the creation by the national authorities of a policy environment conducive to ICT use in education.
- Measures to support and/or encourage public- and private-sector educational establishments to acquire ICT equipment (e.g. specific government grants including a budget for maintenance services, tax credits on equipment and ICT software for schools and colleges, investments in research and development for the design of low-cost ICT equipment and software or the funding of these activities).
- Adjustment of study programs to accommodate the inclusion of ICT and the development or acquisition of software programs

and standardized digital educational content offering guaranteed quality.

- Massive, measured development of training programs for teachers in subjects related to ICT or in the use of ICT to enhance the teaching of other subjects.
- Positive, flexible school policies enabling well planned access for teachers and learners to ICT equipment in support of study programs.
- An appropriate national monitoring and evaluation system to enable regular assessment of results and gains in effectiveness and to detect possible gaps and failures with a view to improving the effectiveness of policy implementation.

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Useful websites

<http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx>

<http://osiris.sn/-Principaux-indicateurs-.html>

http://www.unicef.org/french/infobycountry/senegal_statistics.html#103

<http://www.africanaute.com/depeches/12541-unesco-irina-bokova-plaide-a-dakar-pour-atteinte-ept>

<http://planipolis.iiep.unesco.org/upload/Senegal/Senegal-Education-Sector-Plan-2013-2025.pdf>

Tunisia

ICT Integration in Education and Training in Tunisia

by Souad Abdelwahed

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Introduction

The Tunisian education system has undergone three major reforms. The first, which founded the system, was introduced in 1958. The second, initiated in 1991, laid the foundations for a wide-ranging reform affecting the philosophy and fundamental choices of the education system by introducing a policy of free, mandatory basic education lasting nine years. The third reform, dating from 2002, saw the implementation of the “school of tomorrow” project¹ with the objective of providing quality education for all. Reform law no. 2002-80 of July 23, 2002², serves as the legal framework for the renovation and dynamization of the Tunisian school system, which seeks to perform the functions of education, instruction and qualification. The main policy lines of the reform were translated into a six-point strategy: 1) putting pupils, the principal stakeholders in the education system, at the center of educational activity; 2) enhancing the professionalism of teachers and supervisory staff; 3) enhancing the status of schools; 4) putting into practice the principles of equal opportunity and educational equity; 5) modernizing the education system and enhancing its ability to meet the increasingly stringent demand emanating from society; and 6) using information and communication technology (ICT)³ in teaching and learning activities.

This study is concerned with the last point: the integration of ICT in education. It is a case study of a specific context, namely the Tunisian school system. It analyzes existing ICT policies and strategies and goes on to identify bottlenecks that arise in such an experience.

1. <http://planipolis.iiep.unesco.org/upload/Tunisia/Tunisia%20Nouvelle%20reforme%20du%20systeme%20educatif%20Tunisien.pdf>

2. The law of 2002 was amended and supplemented by law no. 2008-9 of February 11, 2008: http://www.e-justice.tn/fileadmin/fichiers_site_francais/droits_homme/legis_nat/sante/L_9_11fevrier_2008.pdf

3. The acronym ICT is convenient in everyday use, but does not really do justice to the diversity and rapidly changing nature of the practices linked to these tools. ICT is not limited to computers nor to the Internet; rather, it covers a number of tools and fields (computers, telecommunications, multimedia, etc.).

1. What is at Stake in the Integration of ICT in the Tunisian Education System

For a better understanding of the path Tunisia has traveled, a brief look at the past is needed. The history of ICT in Tunisia is recent, beginning with a few initiatives and leading to certain well thought-out action plans. In fact, the concepts and the functions assigned to the introduction of ICT in the education system have shifted over time around four key areas: technical, administrative, relating to ICT as a scholastic subject of study, and pedagogical.

The e-administration program

The introduction of ICT in the administration of the Ministry of Education is part of a national e-administration project. In this respect, ICT is regarded as a key vehicle for reform and modernization of the public sector, with the goal of making the administration more open, more efficient and closer to users. In fact, Tunisia dematerialized its administrative services at the end of the 20th century, put government administrations on the Internet in 2000 and adopted an action plan for implementing the e-administration project in 2006. Continuing in this vein, in 2010 the government proposed an “e-strategy 2010-2014”⁴ for the development of e-administration. The plan calls for the implementation of e-government by 2014, with the objectives of integrating administrative channels, transforming administrative procedures, methods and means of communication, interoperability between information systems and adjustment of the legal and regulatory framework.

4. http://www.Tunisia.gov.tn/egov_tunisia.pdf

The development of the e-administration concept takes account of certain key factors, particularly ICT infrastructure, the legal framework and computer security. Concerning infrastructure, the country has seen considerable change since the 1970s with the creation of the National ICT Center (*Centre national de l'informatique* – CNI) in 1975. The CNI played an important role in 1) the planning and organization of the ICT sector in Tunisia and the preparation and monitoring of the National ICT Plans (*Plans nationaux informatiques* – PNI); and 2) the rationalization of purchasing of ICT equipment, products and services by the government administration and public enterprises.

Thanks to ICT, administration was upgraded through several projects that introduced important innovations in administrative management and services. The drivers of online services included:

- **INSAF:** This is a civil service personnel management system based on a single file for each government employee and liquidation of wages and salaries. It was used to launch a service of remote generation of all documents relating to civil service wages: pay slips, payment orders etc. This solution enables regional expenditure authorization officers to avoid pointless travel and to provide them with service of good quality. This teleprocedure was deployed countrywide as from 2005.
- **ADEB:** This is a budget decision-making support tool available since January 2005. The application keeps track of the execution of public expenditures and manages the entire spending chain. It is a management and communication tool that is accessible to all involved in spending. It keeps the budget accounts up to date in real time.

Within the Ministry of Education, three institutions have historically been involved in supporting schools and education administrations in the integration of ICT. The Bourguiba Microcomputing Cen-

5. *Journal officiel de la République tunisienne*, December 30-31, 1975: http://www.cni.nat.tn/FR/SCRIPT/DOCS/textes_juridiques1.pdf

ter (*Centre Bourguiba de micro informatique – CBMI*), created in 1984, was transformed in 1990 into the National Institute for Office Software and Microcomputing (*Institut national de la bureautique et de la micro informatique – INBMI*) and charged with realizing the country's choices concerning equipment and Internet connections as well as ICT integration. In 2011, it was again renamed as the National Center for Education Technology (*Centre national des Technologies de l'éducation – CNTE*)⁶ with a new status and new responsibilities for the achievement and promotion of ICT-assisted learning and training and the integration of ICT in the education system. Where ICT-assisted school management and administration are concerned, we may mention a few flagship projects:

- **EduNet:**⁷ EduNet is a multilingual Web portal dedicated to education, developed by the INBMI in cooperation with the Ministry of Education. It provides access to administrative and educational services: Web services, downloading, database services, email and group work services. All users interested in administrative documents will find ministry circulars, external and internal competitive examinations, a selection of media coverage of education, and reference documents on EduNet. In this respect, it must be admitted that among the applications available on EduNet, those most used are the those for the results of national competitive examinations and online enrollment, following the online publication of administrative forms and the decision to make their use obligatory for public bodies in 2007.
- **EduServ:**⁸ This is a system for management and evaluation of schools' internal resources. With a simple, flexible interface developed under Windows, EduServ makes it possible to improve and automate the management systems of Tunisian schools. It allows pupils to consult their grades, days of absence, sanctions, examination results, etc.

6. www.cnte.tn

7. www.edunet.tn

8. <http://www.eduserv.edunet.tn>

- **ENT project:**⁹ This is a digital workspace whose purpose is to improve management of administrative data at the primary school level. It is a platform based on the open-source software TRIADE that offers Internet access to information on school affairs: 1) **student affairs** (absences, lateness incidents, excuse notes, grades, class schedule, reservation of resources, news, subjects of study, sanctions, etc.); 2) **collaborative work and documentation** (email, forum, administrative circulars, etc.); and 3) **teaching** (creation of lesson plans, access to digital resources, parent-teacher correspondence notebook, skills and aptitudes booklet, logbook, shared daily planner, etc.).

Thus, the first steps have been taken in introducing e-administration, but what matters most is the updating and constant replenishment of websites so as to ensure their effectiveness and efficiency in achieving the stated objectives, particularly as regards the simplification of administrative procedures and channels and bringing the administrative departments of education institutions closer to the citizens. Currently, e-administration within the Ministry of Education generally takes the form of information and guidance, but it is necessary to make the transition to an interactive relationship between the administration and citizens and between the administration and educational institutions. This involves a great deal of legislative, regulatory and institutional effort toward a digital culture. For example, it is not possible today to send a request to an administrative mediator over the Internet, and no government administration will reply to email from a citizen. It is important to have administrative communication officers tasked with sorting, replying to, and if necessary collecting and using this excellent source of contacts between citizens and the education administration.

Recently, the CNTE upgraded the education portal EduNet to allow greater personalization of services and more contributions from users (teachers, parents, pedagogical and administrative supervi-

9. <http://www.ent.cnte.tn>

sors). It also modified its current activities aimed at promoting the culture of open-source software (competitions, computer science clubs, etc.) and provision of digital content.

The introduction of computer science as a new scholastic subject

The introduction of computer science in the Tunisian school context began in 1984 with instruction in ICT in pilot high schools as a new subject studied by pupils to learn about these technologies. Next, since the 1990-1991 school year and as part of the reform of the education system, computer science has been an optional subject of study. At the time, this subject was offered for two grades only: the third and fourth secondary years in the science and economics track. For lack of equipment, the experiment began in just a few high schools, and the computer science programs were flawed by certain discontinuities that made instruction in the subject rather ineffective. To address this situation, it was necessary, as a first step, to scale up instruction in computer science in the final year of secondary education (*classe terminale*). As a result, at the beginning of the 1999-2000 school year it was taught in all technical, economics and management sections at the secondary level. In 2005, from optional and reserved for the higher secondary grades, computer science became a mandatory subject in all senior secondary tracks.

The second step came in 2003, when the subject was introduced in the last three years of basic education. In fact, in middle schools, computer science was neither mandatory nor even structured as a scholastic subject. Use of ICT was optional and confined to computer clubs. Even in middle schools that had computer equipment, pupils had little opportunity to use the computers, owing to slow administrative procedures and teachers' indifference to ICT. It was not until the beginning of the 2007-2008 school year that computer

science became a mandatory subject in the seventh year of basic education.

At the primary level, it was at the start of the 2004-2005 school year that instruction in ICT was made mandatory as from the fifth year of basic education. This decision was aimed at 1) developing specific ICT skills in pupils from an earlier and earlier age; 2) familiarizing pupils with ICT when quite young; and 3) getting them accustomed to working in groups.

This gradual scaling up and the mandatory nature of education in ICT, at all levels and in all sections, were combined with the adoption of a clear, holistic and integrated approach requiring that measures be implemented simultaneously on several fronts. This approach, applied as a matter of priority to high schools and middle schools, identified four complementary lines of action undertaken during the 1998-2002 period:

- **Building human resources:** the scaling up of computer education engendered a real need for teachers¹⁰. The early 1990s were marked by the coexistence of two teacher profiles. In fact, this subject was taught by master's degree candidates in computer science alongside teachers from other subjects. The presence of the latter, who were well motivated to teach and use ICT and well prepared pedagogically, helped to open up ICT to other subjects, thus promoting interdisciplinarity and setting an example for other teachers. Training requirements were determined on the basis of the profile of active ICT teachers, focusing on the didactics of computers, computer science and ICT. Training and reconversion training were provided by the INBMI during the school year and in summer school.
- **School programs:** It should be noted that teaching computer science is completely in line with a well-defined track in the education program, which is based on the "school of tomorrow" reform. The knowledge and know-how imparted by this com-

¹⁰. The supply of holders of university degrees in computer science currently exceeds the demand from the education system and the job market in general.

puter science program include the need not only to understand and analyze but also to imagine, create, explore and discover. With the scaling up of instruction in ICT, school programs became more rich and diverse.

- **Equipment for schools:** the extension of computer instruction to schools was accompanied by equipment purchasing. The “Computers for Everyone” project launched in 1988 was aimed at massive provision of hardware to all high, middle and primary schools in the country. Between 1998 and 2011, a total of 116,537 computers (including 13,575 laptops) were provided to schools. The application of education programs in computer science is based primarily on a practical approach. Classes are held in the computer laboratory in order to exploit all the teaching resources available there (local network, appropriate software, Internet access, printer, scanner and media library).
- **Internet connection for institutions:** beginning in 2001-2002, the Ministry of Education began a drive to connect all educational institutions to the Internet. In this context, the INBMI, acting as an Internet service provider (ISP) in the education sector, contributes to the development of the National Education Network by connecting institutions to the Internet and to education-related digital networks. The INBMI provides Internet access to schools, teachers and Ministry of Education staff using several types of connections offered by the telecoms company (one-station or network STN, LS, ADSL). Today, the Tunisian Education Network covers all educational institutions and all administrative institutions under the authority of the Ministry of Education. The INBMI also provides an email platform for users of the ministry’s educational and administrative network.

Integration of ICT in teaching practices

In addition to teaching of computer science, ICT has gradually been integrated in some subjects, bringing new, transdisciplinary and cooperative learning practices through the promotion of school

networks and creativity areas for pupils. The integration of ICT in teaching practices began primarily with:

- **the integration of ICT in teaching practices as learning tools:** initially, this was done in planned, monitored and regularly evaluated pilot experiments. As part of the process of educational reform, significant experiences were identified, particularly those that provide help for pupils having difficulty and improve the quality and effectiveness of instruction;
- **awareness raising:** the aim of awareness-raising activities is to demystify ICT, to help people understand the basics and the issues, to show various uses of ICT in the learning process and to promote good practices in this area. These activities also offer an opportunity for awareness raising in the school's environment and to invite the community to participate through partnerships in the new dimensions of the school. Other awareness-raising activities were aimed at the private sector and the services sector, to encourage them to produce content for the education sector and to promote content that can be used in education. This was done through actions such as the dissemination of news through various media (brochures, radio or television shows) and the organization of national and regional seminars on ICT integration in education.
- **teachers' Intranets:** schools form in groups for experimenting, evaluation and production of teaching-related content and participate with other institutions and other actors in various networks for exchange of ideas;
- **promotion of spaces for creativity:** the activities of Internet clubs, which encourage learning approaches, are based on creation, communication and cooperative work. Pupils' best creations are published on the school Intranet and on the education portal EduNet;
- **development of digital educational content:** provision of equipment to schools and construction of infrastructure are far from enough to ensure the integration of ICT in schools. Without digital educational content that matches what is taught in class,

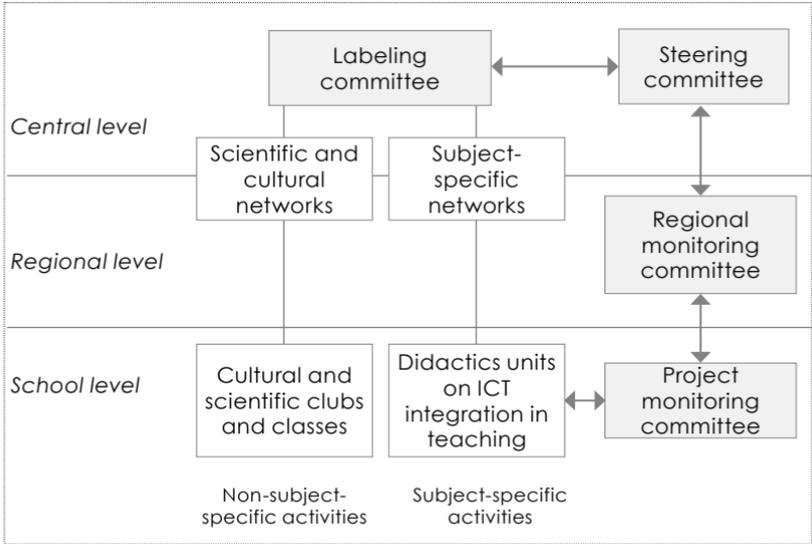
the infrastructure remains unused. To bring about the changes required by the official school programs, aid measures are needed, to be provided through the national education portal EduNet, which is designed for sharing of resources and experience related to the introduction of learning methods. In line with this, the education network, through Web services provided by schools and by regional and national networks on specific subjects or themes, helps to disseminate and win appreciation for the output of teachers and pupils as an inexhaustible source of documents, teaching tools and learning approaches. This is to be accomplished by setting up:

- > websites for the subject networks;
 - > websites for networks of scientific and cultural activities;
 - > a didactics library serving as a resource center on educational applications of computers;
 - > websites for evaluation resources (questions from national examinations, a databank of exercises, etc.).
- **The creation of permanent training and learning networks through EduNet:** the aim is to provide teachers with in-service training and appropriate documents and self-training materials. In fact, teachers have access to a great variety of teaching resources and often receive technical and methodological support to help in using them. Through EduNet, in-service training programs are offered to teachers as a result of the conduct of subject-specific networks, the development and dissemination of learning and remedial support websites, and the creation of:
 - > a virtual education library;
 - > a distance training network;
 - > an e-learning platform;
 - > a virtual ICT school;
 - > a Tunisian digital school.
 - **Monitoring and management of the project to integrate ICT in teaching practices:**

To ensure that all components of the Ministry of Education were fully engaged, the program to accelerate ICT integration for edu-

cational purposes sought the involvement of all levels – central, regional and local – in order to combine their efforts to achieve the objectives. For example, each school or other educational institution pledges to monitor the implementation of its own ICT project. As a result, each institution forms an ICT group to monitor the project. In addition, regional committees have emerged to follow up on actions taken at school level and for smooth exchange of information among the working groups in the region. Moreover, a project steering committee for monitoring and evaluation and a content labeling committee were formed in the Ministry of Education. The figure below presents this ICT integration procedure in summary fashion:

Figure 1. ICT project monitoring and steering bodies in the Ministry of Education



Training in and through ICT

Pre-service training:

Pre-service training for primary-level teachers was originally provided by the *École normale*, which admitted students who chose teaching careers and provided appropriate training sanctioned by a diploma that gave direct access to teaching jobs. However, the teaching force trained in this way could not meet the strong demand for primary education in the decades after independence. The government thus turned to high school graduates (holders of the *baccalauréat* degree) from the various branches of secondary education, which led to different levels of qualification within the teaching force. The 1990-1991 university year saw the creation of a single university-level track (*baccalauréat* plus two years of post-secondary education) for pre-service training of primary school teachers. However, this training program was ended as from the 2008-2009 university year. Secondary school teachers must hold a master's degree in the subject they teach.

Considering the strategic role of the pedagogical framework in building tomorrow's schools, one of the urgent measures taken in the 1990s by the Ministry of Education was to endow future teachers with ICT skills during their university education. For this purpose, action was taken to:

- implement in teachers' colleges (*Instituts supérieurs de formation des maîtres* – ISFM)¹¹ the necessary training modules on ICT and on the design and utilization of teaching sequences that use these technologies;
- introduce ICT modules in the master's programs of higher education institutions;
- enable teachers to design and carry out teaching sequences that include computers as part of their training.

11. The ISFMs were closed during the 2008-2009 academic year.

In-service training:

Training of teachers, pedagogical supervisors and administrative supervisors is given high priority in the ICT integration strategy of the Tunisian education system. The supervisors are expected not only to use computer systems in performing their jobs, but also to produce, process and exchange digital content. Whence the proposal to develop a set of skills concerning uses, procedures, leadership and production, as well as technical and management aspects, and all this is done while at the same time emphasizing the integration of these technologies in the education system.

1. *Training of network leadership teams:*

This training program is intended for stakeholders in subject-specific networks. It focuses on the Internet, Web production and multimedia, and is designed for each target group:

- resource persons,
- teachers in service in schools,
- inspectors and pedagogical advisors involved in leading subject-specific networks;
- the departments of the Ministry of Education responsible for promoting content development in the context of national projects.

2. *Training of technical teams:*

This training program is intended for network managers, technicians at school level, administrative staff and those responsible for content development. Three types of training are provided, according to the target group:

- training in the administration of networks such as Internet and intranets, particularly in the following aspects: user management, network oversight, reports and statistics, and security management;
- training in remote maintenance and both local and distant administration of systems and websites;

- training in the development and administration of website content.

3. *Training of administrative supervisors:*

Training for administrative supervisors is aimed at developing skills relating directly to their administrative tasks. The training program focuses on office software and Internet tools, improving these stakeholders' ability to initiate, monitor and oversee projects to introduce ICT at school level.

4. *Training of inspectors and pedagogical advisors:*

Training of inspectorate officials and pedagogical advisors is designed to produce a technological and pedagogical *avant-garde* on the subject of ICT integration and management of the supervisory framework for teachers. This training program supports teachers, sensitizes them to the contributions that ICT integration in education can bring and promotes the production of content. Some inspectors and pedagogical advisors have the option of specializing in digital instruction, and in this case, they receive more substantial training of trainers to enable them to train and supervise other supervisors in this area.

5. *Training for computer science teachers:*

Ongoing high-quality training in ICT should be introduced for teachers of computer science.

6. *Training for teachers of other subjects:*

This is the keystone of the project. In order for the changes to reach the classroom level, teachers often need additional technical and pedagogical support:

- **teacher training in ICT:** the objective is to give teachers the skills they need to use the main functions of computers and associated applications: word processors, design and multimedia tools, networks, etc.

- **pedagogical training for teachers:** this component prepares teachers to work with training modules that integrate ICT in the teaching-learning process. It provides more extensive training so that teachers will no longer be content with simply using teaching software but will take on the role of designers and creators of teaching tools and educational software that can help create learning environments that include ICT. The program is delivered in seminars and other training sessions (school vacations, summer school, etc.), with a varied, progressive modular structure that enables motivated teachers to fine-tune their ICT integration skills.

ICT and curricula

Appropriate educational content is just as important as ICT infrastructure for using ICT in teaching practices. Yet right from the introduction of microcomputers in schools, the Ministry of Education found it difficult to define what educational content would meet the needs of a country where the population speaks Arabic, along with a market too small to enable private software publishers to invest in developing educational software rooted in the Tunisian socio-cultural context.

In addition, at the start-up of the ICT integration experiment, the digital content developed by the INBMI was not of good quality, owing to lack of time, technical problems and the difficulty of organizing and giving material and moral encouragement to potential contributors among the teaching force and the pedagogical advisors. It is almost unthinkable to use content produced by the private sector, which is even more deficient. There is a particular lack of appropriate pedagogical approaches. For example, the INBMI provided schools with high-tech equipment such as interactive whiteboards (IWBs) and language laboratories, but the equipment remained unused for lack of digital content and, in some cases, unwillingness.

Faced with this alarming situation, the INBMI has revived digital production in recent years. In December 2010, for example, a committee was formed and an action plan defined. Currently, in partnership with the National Pedagogical Center (*Centre national pédagogique* – CNP), the CNTE is moving toward internal development of digital resources that are in line with the official programs and methodological instructions and designed for teaching on four levels: primary education, the second level of basic education (roughly the equivalent of junior secondary education), senior secondary education and distance training of the teaching force.

Priority was given to the digitization of textbooks for the nine years of basic education. This content is available in “flip book” format, containing the textbook content plus interactive exercises that previously had been provided on CD-ROM along with the print content. At the secondary level, digital teaching content has been developed primarily for scientific subjects (mathematics, physics, computer science, life and earth science, technical subjects). In addition, students can consult unpublished examination questions, with answers and explanations, on the website *Révisons le bac ensemble* (“Let’s Study for the *Bac*”), a free exam preparation site for secondary education that offers useful content and interactivity.

ICT and marginalized groups

In a country like Tunisia, where the divide between urban and rural areas has persisted for centuries, the problem lies in making up the lag in information technology, in the form of inequality of infrastructure across the country’s regions. In this context, the digital literacy programs run by the CBMI and the INBMI, until the beginning of the new century seem also to have adhered to? a centralized conception? of development that did not take the regions into account. In fact, regional centers for continuing education and training (*centres régionaux d’éducation et de formation continue* – CREFOC) were not created in the governorates until 1998.

The new teaching methods and tools were introduced first in locations where socio-economic conditions were favorable, i.e. in urban areas where families' living standards were high enough to bear the additional expense of access to these technological tools. Thus, the first pilot experiences of teacher training in Internet use in the year 2002 took place in high schools located in Tunis (Lycée Sadi-ki) and Carthage (Lycée Byrsa). The question is not, indeed, one of ICT skills or abilities but of whether an appropriate context exists for equitably distributed access and democratic penetration of ICT in schools.

Policymakers, convinced that "today's illiterates are not those who cannot read and write but those who cannot use ICT", have used ICT as a means of democratizing knowledge, notably through 1) the launch of the "Computers for All" project and the "Internet for All" project as a strategy aimed at bringing Internet use to the masses so as to make the new ICT applications available to all segments of Tunisian society; 2) the development of "self-service" Internet access points through the creation of public Internet centers (*Publinets*)¹² in remote areas; 3) the launch of the "family computer" program (1999) to provide every household with a PC and an ADSL connection; 4) computer-equipped mobile libraries; and, 5) the organization of "Internet caravans" to reach the most isolated areas of the country.

On the other hand, investing in education means investing in human capital and in the country's intelligence. From this point of view, any marginalization means a loss of economic growth potential. Based on this conception, the Tunisian school system is already pursuing a strategy that proposes solutions. This reduction of disparities between regions and between social and geographical categories of pupils is illustrated operationally by, among other things,

12. The Publinet project was mounted to cope with the lack of infrastructure and the high cost of Internet access in Tunisia. These public (but privately managed) Internet access points appeared in 1998, as the result of a government initiative to expand Internet access and increase employment of young graduates. In June 2002, there were 306 Publinets in Tunisia.

1) the extent of ICT equipment in schools, given the corrective effect that schools can have for children lacking Internet access at home; 2) the implementation of the program of scaling up ICT integration in schools, with priority to schools in the Priority Education Program (*Programme de l'éducation prioritaire* – PEP)¹³; and, 3) the upgrading of the national education network to the third-generation (3G) “Edunet 3” in accordance with the convention concluded between the Ministry of Education and the Tunisian telecommunications company. The aim was to extend Internet access to all educational institutions, including those located outside the telecommunications network, using 3G USB keys. To ensure equity between regions and between schools within a given region, a table of the distribution of 3G keys among primary schools not covered by the fixed-line Internet service is posted online.

The effectiveness of these actions is reflected in certain ICT indicators, as shown in Table 1:

Equipment and Internet connections of primary schools

Table 1. Equipment and Internet connections of primary schools (2011-2012 school year)

No. of primary schools	Equipment					Internet connection		
	No. of pupils	No. of schools with equipment	No. of schools without equipment	No. of computers	No. of computers per 25 pupils	Connected schools	Schools that could not be covered	ADSL connection rate (%)
4,518	1,002,296	4,508	11	36,064	0.90	2,079	2,428	46.02

In the rollout of the third-generation Edunet 3 educational network in 2012-2014, primary schools that were difficult to connect by ADSL were provided with 3G USB keys. As a result, Internet coverage of primary schools in 2013 had changed substantially:

13. The Ministry of Education initiated the PEP in 2000, taking a series of measures to increase the human and material resources of these schools in order to enhance the instruction provided while taking account of the specific conditions and needs of pupils and their teachers.

Table 2. Internet connections of primary schools (2013-2014 school year)

	No. of schools	Means of connection	
		ADSL	2G/3G key
Primary schools	4,520	2,086	2,427

Equipment and Internet connections of middle schools

Table 3. Equipment and Internet connections of middle schools (2011-2012)

No. of middle schools	Equipment		Internet connection		
	No. of computer labs	No. of computers	No. of middle schools with ADSL connection	No. of middle schools with VSAT connection	No. of middle schools with no connection
917	1,706	17,060	843	72	2

Equipment and Internet connections of high schools

Table 4. Equipment and Internet connections of high schools (2011-2012)

No. of pupils	Equipment					Internet connection		
	No. of high schools	No. of computer labs	No. of computers	No. of computer science labs	No. of computers	No. of high schools with ADSL connection	No. of high schools with VSAT connection	No. of high schools with no connection
504,882	542	1,610	16,100	683	10,245	524	12	5

2. Bottlenecks: A Critical Assessment of ICT Integration in Education

On the basis of administrative data and previous studies, we here undertake a critical assessment of the actions taken in the late 20th and early 21st centuries (before the 2009-2014 ICT strategy). This phase pointed to a number of problems, as discussed below.

Dissemination of ICT without a holistic vision and a systemic strategy

When the “Schools of Tomorrow” project was launched, the policy was not based on scientific and academic research, nor on a strategy that had previously been discussed and validated by the interested parties. The policy aspect preceded the scientific, by creating an interconnected space that laid the foundations for “computers for all” and planned to scale up Internet connections, with the prospect of connecting high schools, middle schools and, subsequently, primary schools. This was done without a coherent vision and national strategy for digital literacy. During the early years of ICT integration, this held back the development of a fair and equitable take-up of these technological tools offering access to knowledge. The fact is that the problem lay in the lack of a strategy taking account of the context and the views of researchers and experts in the technical, pedagogical, economic and organizational fields.

The stock of computers

Noteworthy aspects here are the deterioration of the hardware stock due to lack of maintenance, the insufficient coverage of the network and the fact that school organization was inappropriate for this ped-

agogical innovation. In a recent study, Abdelwahed (2011) comes to the same finding: a mismatch between resources and needs for the use of ICT in education. On the basis of a survey of teachers, the author notes that teachers are convinced that ICT improves learning but feel that the resources provided are insufficient for equitable, systematic access. They also saw their knowledge of ICT as rather limited and would welcome training to help them cope with classes that are more enthusiastic in the presence of ICT.

The sustainability of the ICT integration project is closely linked to maintenance and regular replacement of infrastructure and equipment. With this in mind, the CNTE is supporting and pursuing the replacement of the computer population in educational institutions. During the 2010-2011 school year, it provided 18,821 new computers to schools, including 4,500 laptops.

Poor pedagogical support for technological progress

These technological advances were not accompanied by programs and skills capable of making them converge toward the goals, much vaunted by politicians, of enhancing and democratizing knowledge. Teachers' ICT training should start from the teacher's new mission, should project itself into the future to design training programs that are consistent with the desired changes. In-service training, however, was focused on the knowledge needed directly for proficiency with ICT tools, neglecting know-how and confidence, which are the other two components of the individual competency that enables teachers to keep up with or even anticipate change. Abdelwahed (2011) noted this problem, reporting that the teachers interviewed spoke of provision of training in basic technical skills, but a dire lack of training in the pedagogical and didactic principles of ICT use. What teachers want is pedagogical use of ICT in which they are proficient in both the tools and the method, but the current institutions are far from being able to satisfy the demand for teacher

training. On this point, Chouk (2012) notes that the greatest error committed in the past was the elimination of primary-level teachers' colleges (*écoles normales d'instituteurs*) and the closure of the higher teacher training institutes (*instituts supérieurs de formation des maîtres*), which provide pedagogical, psychological and mental preparation for the teaching profession.

Teachers have lost their taste for innovation

According to Chouk (2012), over the last 20 years the stakeholders in the education system have not managed, particularly in basic training, to master existing knowledge and show some innovation. Cross-cutting skills based on training in critical thinking, problem-solving ability and career planning are not given sufficient weight. The trouble is that most teachers have lost this spirit of initiative by settling into a certain laziness that can impede the proper conduct of the lesson and can “rub off” on pupils. The lack of critical thinking on the part of both teachers and learners is pointed to as explaining this phenomenon, which has been exacerbated in recent years, particularly in Tunisia, preventing any intelligent take-up of the new pedagogical tools.

Lack of evaluation of in-service training

The lack of monitoring and evaluation of teacher training in ICT use, delivered by the CREFOCs, is another problem area in Tunisia's experience of ICT integration in education. Although Tunisia does have traditions of in-service training (no basic training), obeying the law of supply and demand, such training seems to ignore the specific needs of teachers. In both form and content, this ICT training program does not include a testing and evaluation mechanism to make teachers aware of what they don't know and to offer them training that matches a need that teachers themselves feel or that inspectors have noticed.

Differences in ICT use between teachers and learners and between rural and urban areas

Despite a well-publicized political drive to develop ICT and integrate it in learning venues, the advent of computer technology in the 1990s created a divide between rural and urban areas as a result of excessive centralization and lack of accountability, combined with a lack of professionalism at most levels of the education system. At the same time, a similar divide was noted between teachers and those they teach. In general, the teacher is found to be the person who finds it hard to keep up with change, who looks for security in what he does know, who needs to get results and does not wish to run any risks. Thus, the reality on the ground diverges from the “consensual official stance”. This finding is confirmed by Abdelwahed (2011), who shows that the acquisition of technological tools, though obviously essential, is only a first step, and must be followed up by integration of ICT in real classroom situations. At present, most of the teachers targeted by the study do not use ICT or use it only for electronic versions of the usual essays and reports, maintaining a lecture style of teaching without changing their pedagogical paradigm in the slightest. In fact, innovative teaching and effective use of ICT are observed only in a minority of Tunisian teachers at all educational levels. This finding leads to the conclusion that integration of ICT in teaching practices is still highly dependent on the enthusiasm of the first innovators, who often devote much of their own time to developing and implementing such initiatives.

3. Technological Plan for Education 2009-2014

For the last five years, the Ministry of Education (MoE) has pursued an ICT strategy with six main areas of activity, presented in Table 5.

Table 5. Strategic areas of activity for ICT integration at the MoE, 2009-2014

Area of activity	Specific objectives
1. Teaching/learning	Make sure that ICT is integrated in teaching and learning.
2. Monitoring, management and communication	Set up and implement integrated information, monitoring and communication systems.
3. Human resource development	Train MoE human resources to ensure success of ICT integration programs.
4. Equipment, networks and systems	Improve planning of requirements and management of the computer stock: determine requirements, plan purchasing, maintenance, etc.
5. Pilot schools	Upgrade the technology of pilot institutions so that they serve as prototypes for ICT integration.
6. Innovative projects	Promote initiative in ICT integration.

In 2010, the evaluation of progress on these strategic areas identified the following weaknesses:

- the fact that school principals headed up the various projects executing the strategy instead of assigning this job exclusively to the project leaders contracted for the purpose;
- the lack of qualitative and quantitative indicators for evaluation of the programs;
- the fragmentation of internal stakeholders and the lack of an action plan hindered the determination of requirements and of well-defined objectives.

The strategy thus had to be adjusted and reviewed with the aim of:

- adjusting the roles of internal stakeholders;
- rationalizing the use of resources and creating a favorable environment for a *systemic, collaborative and synergistic approach*;
- finding a response to the growing concern with efficiency and quality improvement;
- meeting the need for good governance and monitoring.

Following these adjustments to the plan, an *ICT program for an efficient, effective education system* was introduced in 2010. Following a systemic approach, this strategy breaks down into five general objectives relating to five main areas of activity, as presented in Table 6.

Table 6. Technological Plan for Education, 2009-2014

Areas of activity	General objectives
1. Restructuring	To create a system that determines correctly the requirements of the education system, means of communication and monitoring, and methods for managing the computer population.
2. Technology (infrastructure and equipment)	To design and plan the rollout of the network architecture and appropriate equipment, and to design the necessary platforms for administrative and pedagogical use.
3. Digital content	To ensure that digital content is available for administrative management and to serve as educational resources.
4. Training (agents of change)	To upgrade human resources in order to ensure that the objectives of the technological plan for education are achieved.
5. Development and consolidation of uses for ICT	To create the mechanisms required for using ICT in both administration and teaching, and to instill, in both pupils and teachers, habits of teaching and learning based on use of ICT.

This table shows that the development of an ICT culture and ICT skills in education personnel remains the cornerstone of Tunisia’s strategy for ICT integration in education. Decision-makers reserved one strategic area for skill building. As a result, inspectors, ped-

agogical advisors, teachers, learners and school managers enjoy targeted training programs in the basics and use of ICT, designed in accordance with the needs and profiles of the target categories. These programs prepare participants for certification in ICT.

According to the 2009-2014 Technological Plan for Education and the CNTE website, the training strategy is divided into four sub-programs or basic objectives:

- define the desired skills to ensure that the training covers the occupational practices expected of participants;
- design certification procedures, set the content of training programs and prepare the learning materials; a list of ICT certificates is presented in Table 7;

Table 7. ICT certification

	Certificate	Acronym	Target group
1	Tunisian Scholastic Computer Passport (<i>Passeport informatique scolaire tunisien</i>)	PIST	Pupils
2	Computer Science and Internet Certificate (<i>Brevet informatique et Internet</i>)	B2i	Pupils
3	Computer Literacy Certificate (<i>Certificat de compétence en informatique</i>)	2Ci	Pedagogical supervisors and teachers
4	Certificate of Ability to Produce Digital Content (<i>Certificat d'aptitude en production de contenus numériques</i>)	2Cpc	Pedagogical supervisors and teachers
5	Certificate of Ability to Integrate ICT in Education and/or Training (<i>Certificat d'aptitude en intégration des TIC dans l'enseignement et/ou la formation</i>)	2CTice	Pedagogical supervisors and teachers
6	Certificate of Competency in the Use and Integration of ICT in the Administration and Management of a School (<i>Certificat de compétences en exploitation et intégration des TIC dans l'administration et la gestion d'un établissement scolaire</i>)	Tic - GE	Administrators
7	Certificate of Competency in the Use of ICT for Management of the Education and Training System (<i>Certificat de compétences en exploitation des TIC pour la gestion du système éducatif et de formation</i>)	Tic - SE	Administrators

- Design and implement a plan for training the various actors;
- Take account of certified ICT training in career paths.

In the next section, the discussion of ICT training will focus on the teacher as the catalyst of the educational reform in general and the use of ICT in particular.

The Computer Literacy Certificate (2ci) program

Provision of schooling cannot be strengthened or improved unless something is done toward a solution to the problem of teacher qualification. Here we may mention the Computer Literacy Certificate (2Ci) program, which puts into practice an initiative launched by the Ministry of Education with the collaboration of Intel Teach Program. The purpose of the program is to develop, reinforce and validate the proficiency of primary, junior secondary and senior secondary teachers in the use of ICT for learning. The approach adopted can be described as follows:

- development and validation of content;
- development of training modules;
- validation of certificates;
- training of trainers and of teacher trainers;
- development and implementation of a regional teacher training plan;
- monitoring and evaluation at the national and regional levels.

The program consists of 36 hours of face-to-face training in the following topics:

- development of skills for the 21st century,
- introduction to the use of computers and the Internet,
- initiation in word processing,
- initiation in multimedia,
- use of multimedia software,
- initiation into spreadsheets,
- initiation into databases,
- initiation into and use of email software,

- development of 21st-century approaches,
- planning and carrying out a plan of action.

Three certificates are awarded for the 2Ci program:

- senior for trainers of trainers,
- master for teacher trainers,
- participant for teachers.

To sum up, the ICT skills that teachers are supposed to develop consist primarily of basic computer literacy and certain types of know-how, including teaching practice based on a scenario of technology use. From October 2009 to December 2010, 6,789 training sessions were held for 136,000 primary and secondary teachers and 5,290 computer science teachers. In actual fact, the teachers did develop a certain technical competency but most of them are incapable today of introducing ICT in the classroom while also giving consideration to the specific features of existing interactions in classrooms and those of technological artifacts. Moreover, they find it difficult to transfer their technological skills to a practical teaching context (Abdelwahed, 2011).

Creation of a master's degree in new educational technologies

In the context of a partnership with the Higher Institute for Education and In-Service Training (*Institut supérieur de l'éducation et de la formation continue* – ISEFC), the CNTE created a master's degree in new educational technologies whose purpose is to set up a mechanism for partnership, exchange of ideas and training specifically for the use and integration of ICT in education.

Open distance training

The CNTE possesses expertise in **e-learning** that has enabled it to develop distance training and learning platforms for teachers with modules on ICT utilization. This learning environment, which uses

multimedia materials combined with text, graphics, sound, computer-generated images, animation and video, allows for a new pedagogical approach, employing more attractive methods in which interactivity plays an important role and offering the possibility of greater adaptation to the learner's specific learning process. Users can learn at their own pace, in accordance with their needs and availability.

In the same vein, the CNTE launched **eTwinning Plus**¹⁴ on March 4, 2013. This is an extension of the eTwinning project to other countries, including Tunisia. eTwinning Plus offers an online platform for collaboration that enables teachers to search for eTwinning projects and to contact educational institutions throughout Europe.

Problems and deficiencies in in-service teacher training

Although there is a national strategy for training teachers in ICT, certain deficiencies have been recognized as a result of the work of Abdelwahed (2011) and a set of interviews conducted by the author with resource persons in the field of ICT integration in Tunisia. These problems may be summed up as follows:

- the lack of a database of teachers with digital proficiency and having received training in the field;
- training activities are numerous but poorly coordinated in space and time;
- training activities are not adapted to various teacher profiles, i.e. there are no levels of training (beginner, intermediate, advanced);
- marginalization of the pedagogical component in favor of technological aspects in the training provided;
- lack of information: teachers, especially in the country's interior, are not aware of the training sessions provided by the ministry;

14. <http://plus.etwinning.net/fr/pub/index.htm>

- no analysis, evaluation or monitoring of training sessions;
- no high-quality teaching resources that adhere to a predefined list of desired skills.

4. Lessons Learned: Factors Favoring ICT Integration in Education in Tunisia

The preceding observations enable us to formulate a few lessons that are rooted in the context of Tunisian education.

An encouraging economic, social and legislative environment

The integration of ICT in education is not an isolated act; rather, it reflects a country's overall ICT strategy and the existence of fertile soil for such an initiative. Particularly in Tunisia, these technologies have the status and attractiveness of "novelty" as well as the support of decision-makers. Indeed, a set of attractive incentives and encouraging measures has been introduced and has made Tunisia a favorable place for ICT development as a major component of a national strategy. Tunisia's interest in ICT development has been reflected concretely by special attention to: 1) private sector development; 2) the institutional environment; 3) infrastructure; 4) the structuring of the ICT sector and liberalization of initiatives; 5) legislation specifically on ICT; and 6) strengthening of regulatory bodies.

Modern, reliable infrastructure

Tunisia has long assigned great importance to its infrastructure, in terms of networks, equipment and services. For example, the telecommunications network, which covers the country's entire territory, has multifunctional high-speed switches that handle voice, Internet and multimedia traffic at the same time. This data trans-

mission network uses a number of technologies: LS, ADSL, Frame Relay, VSAT, etc.

The transition from “schooling for all” to “quality education for all”

The universalization of education in Tunisia has been a government priority since independence. Free schooling was one of the missions assigned to the school system. Universal basic education is now a tangible reality: 99.4% of all 6-year-old children were enrolled in school in 2013. To narrow the gap between the demand for a knowledge society and the supply of basic education, a quality approach was implemented. The Tunisian education system is trying both to comply with international standards and to respond to learners’ needs. The important thing here is not attempts to improve the existing system but rather efforts to do things differently, through, among other things, the optimal and efficient use of ICT and the creation of a core “excellence” group of schools that use ICT in teaching and learning.

Financing

The ICT integration scenarios proposed by the Ministry of Education entailed sizeable budgets, which in turn required the ministry to seek other sustainable modes of financing, namely:

- the introduction of private partners through school sponsoring;
- support from organizations such as the World Bank, Microsoft, Apple and Intel for ICT integration at all levels of the education system. These organizations support the government in the implementation of ICT training programs for staff; support professional development; provide opportunities for networking; and seek, develop and evaluate new approaches to rollout of ICT infrastructure. Innovative projects include mobile laboratories and buses with satellite Internet connections, which are

intended for rural or remote schools and are aimed at reducing the digital divide;

- mobilization of civil society to provide material assistance for the operating expenses and equipment replacement of computer laboratories and for Internet connection costs.

5. Imperatives for Tomorrow

There have been achievements, to be sure, but further effort is required for successful integration of ICT and for a high-quality education system. This report emphasizes two points that seemed crucial to the author.

Adoption of a holistic approach encompassing various components

The adoption of a holistic, systemic approach is one of the conditions for successful integration of ICT in an education and training system. Tunisia today needs to develop strengthen, concerted action plans that involve the main partners and stakeholders so as to be able to develop or adapt appropriate strategic, pedagogical and methodological models for creating a quality education system. The main determinants of quality in Tunisian schools are as follows:

- pedagogical factors: learning content and methods, evaluation procedures, teaching tools;
- teachers' level of qualification and preparation;
- school administration and management;
- availability of equipment and supporting teaching/learning materials;
- teaching comfort.

Accountability and encouragement of initiatives

- develop a culture of evaluation at all levels of the system;
- decentralize and delegate more authority to the regions;
- grant more autonomy to schools;
- encourage and capitalize good practices, particularly concerning integration of ICT.

Conclusion

In January 2011, Tunisia initiated a decisive new phase of its history. Like other vital sectors such as health and the economy, education is in an emergency situation. The question of ICT integration in education and training lies at the intersection of several important issues that determine the quality of the Tunisian education system. All of this makes ICT a vital issue for the future of the country.

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Uruguay

Integration of ICT in Uruguay's Education System

by Diego Filmus

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Executive Summary

This paper presents the following regarding ICT Integration in Uruguay's education system:

1. Background Information on the Oriental Republic of Uruguay

With over 3.3 million inhabitants, Uruguay is considered an upper-middle income country and one of South America's leaders in human development. The country experienced strong economic and social growth in the past decade after a severe economic and social downturn during 1999-2002.

2. Educational Overview of Uruguay

During the recovery and expansion of 2003-2013, Uruguay also experienced growth in its educational system. These changes were consolidated in 2008, through the approval of a new General Education Law which guarantees education as a fundamental human right and as a public good.

3. ICT Overview of Uruguay

According to the United Nation's International Telecommunication Union (ITU), Uruguay ranks first in South America on the ICT Development Index (IDI). Since 2007, Uruguay's ICT policies have been framed within a national coordination strategy called *Uruguay's Digital Agenda* (UDA). The 2011-2015 plan focuses on social inclusion and strengthening national capacity through ICT. While the previous versions prioritized the construction of infrastructure, the current UDA places emphasis on generating direct and concrete benefits for citizens.

4. Analysis: Uruguay's Education and ICT integration policies

With the above background and overview, this section presents two themes of analysis: ICT integration policy development and implementation and teacher training. Concretely, three key policies are analyzed to demonstrate what has been accomplished, how and the lessons learned, including the enabling environment and factors that constrain or promote ICT integration initiatives:

- i. *Uruguay's Digital Agenda (UDA): Internet for all and Digital TV.* The first of six strategic guidelines of UDA is *Access: "Connectivity for inclusion."* ICT access is defined as a necessary condition, though not sufficient, for social integration and bridging the digital divide. The universalization of broadband and digital TV is the main challenge facing Uruguay in the coming years, and necessary for providing an enabling environment for ICT integration in education.
- ii. *UDA: ICT in Education and Education in ICT.* Since 2008, the direction of Uruguay's education ICT integration policy has been framed by the General Education Law, which states: "The State shall provide students who attend compulsory state education access to information and communication technologies, while promoting their maximum and meaningful use for education, and their appropriation by learners." In this context, the second of the six UDA strategic guidelines is *Education and Culture: "Building capabilities for the future."* The 2011-15 plan asserts that the use of ICT in education has started a social revolution in Uruguay and has laid the foundations for the establishment of a new type of citizenship, a digital one. This period is focused on continuing this digitalization process, expanding and leading it beyond the limits of the formal education system, thus providing everybody with the necessary skills to achieve well-being in the information and knowledge society.
- iii. *CEIBAL, ICT integration and teacher training.* Plan CEIBAL (Educational Connectivity and Basic Computing for Online

Learning) is a 1-to-1 initiative destined to reach every student and every teacher in public schools across the country with a free laptop. The plan is supported by the international One-Laptop-Per-Child (OLPC) initiative. CEIBAL is the first fully implemented OLPC project, and thus represents a model for analyzing lessons learned and the factors that promote ICT integration initiatives.

- iv. By 2012, 570,000 XO laptops had been distributed, covering all students and teachers, and virtually all schools have internet access. In order to overcome the initial difficulties related to the digital literacy of the teachers and promote good practices in education related to ICT, the authorities have offered a training plan that has been implemented gradually and has adapted different modalities according to demand, responding to difficulties and challenges presented, and placing emphasis on training the entire teacher community as a fundamental objective to ensuring the sustainability of the experience.

5. Uruguay's Regional Integration and South-South Cooperation in ICT and Education

As the first country to fully and successfully implement a 1-to-1 program, Uruguay has also developed a cooperation policy for sharing its experience and expertise internationally. Under the umbrella of CEIBAL, the Foreign Service policy aims to support and advise governments, foundations and civil society organizations, among others, in the implementation of plans for including ICT in education.

Earlier this year, the Organization of Ibero-American States for Education, Science and Culture (OEI) announced that the national office in Montevideo will launch a headquarters for coordinating activities among the MERCOSUR member countries by 2014. Further collaboration in the field of ICT and education between the OEI and Uruguay was consolidated when they signed an agreement with the Spanish *Fundación Elecnor*, in the framework of *Lights for Learning*, to provide solar energy to all remaining schools without

electricity, while working with Plan CEIBAL to distribute the computers to every teacher and student, while ensuring connectivity to overcome the remaining digital gap.

1. Background Information on the Oriental Republic of Uruguay¹

Uruguay is located in South America, bordered by Brazil to the north, Argentina to the west and the Atlantic Ocean to the east and the south. Considered an upper middle income country and one of the regional leaders in human development, Uruguay experienced strong economic and social growth in the past decade after a severe economic and social crisis during 1999-2002. From 2000 to date, GDP grew over 70%. Also, a drop in the GINI rate marked a significant improvement in the distribution of wealth. This positive panorama is reinforced by a decreasing infant mortality rate and increasing life expectancy. Also, between 2007 and 2010, the population without sufficient income to cover basic food and services decreased by half.



1. All of the data on this page is taken from: IIPE-OEI (2012), *Perfil Uruguay, Sistema de Información de Tendencias Educativas en América Latina (SITEAL)*, www.siteal.iipe-oei.org.

General Data		Development Data	
Land mass	176,215 km ² , 91st largest in the world	GDP (PPP) per capita	\$13.961 (2010)
Political System	Unitary presidential constitutional republic	GINI	0.422 (2010)
Administrative Political Divisions	19 Departments, 89 Municipalities	Human Development Index (HDI)	0.736 (2000)
Official Language	Spanish	HDI in the year 2000	0.783 (2011)
		HDI Global Position	48 (2011)
		HDI Regional Position	3 (2011)
		Unemployment Rate	6.0% (2011)
Demographic Data		Social Spending Data	
Total Population	3,372,000 (2010)	Total Social Spending as % of GDP	23,32% (2009)
Urban Population	92.4% (2010)	Total Education Spending as % of GDP ²	4,22% (2010)
Dependency Rate	57.2% (2010)	Total Health Spending as % of GDP	8,43% (2009)
Migration Rate	-3.0% (2005-10)		
Fertility Rate	2% (2010-15)		
Life expectancy	77 yrs (2010-15)		

2. Instituto Nacional de Estadísticas (2012), Uruguay en Cifras, <http://www.ine.gub.uy/biblioteca/uruguayencifras2012/Uruguay%20en%20cifras%202012.pdf>

2. Educational Overview of Uruguay³

During the recovery and expansion of 2003-2013, Uruguay also experienced growth in its educational system. These changes were consolidated in 2008, through the approval of a new General Education Law which guarantees education as a fundamental human right and as a public good.⁴

Compulsory education as per the General Education Law stretches from the age of four and five during initial education until the completion of secondary level education.

Late enrollment

Compulsory school attendance as established by law indicates that at six years of age, all children should be attending the first grade of primary school. This objective has been essentially met with almost all (98%) 6 year olds attending school.

Early Schooling

Currently, about 96% of all 5 year olds and 85% of all 4 year olds comply with compulsory education and are enrolled in pre-primary schooling. These numbers increased significantly during the 2006-2011 period: 13% for 4 year olds and 1% for 5 year olds. While there is a negligible gap between 5 year old enrollments from different social sectors, among 4 years there is a persisting inequality: 76% of 4 year olds living in the most disadvantaged households are in school, while 88% among those from the highest social stratus are attending.

3. All of the data on this page is taken from: IIPE-OEI (2012), *Perfil Uruguay, Sistema de Información de Tendencias Educativas en América Latina (SITEAL)*, www.siteal.iipe-oei.org.

4. Ministerio de Educación y Cultura (2008), *Ley General de Educación de Uruguay*, http://www.mec.gub.uy/innovaportal/file/431/1/ley_educacion.pdf

Access, repetition and graduation from primary education

In 2011, the net primary school enrollment rate reached 95%. The proportion of students who attended primary level aged two or more years higher than their grade level was at 10%, which implied a reduction of 3% since 2006. Also, the graduation rate for the primary level is 98%. That is, 98% of the youth aged 15 who enrolled at the primary level, completed it.

Access, repetition, and graduation from secondary education

In 2011, the net secondary enrollment rate reached 76%. This implies an expansion of about 5% for the 2006-2011 period. In 2011, 33% of the students who attended the secondary level were aged two years or older than their grade level, implying a 1% improvement since 2006. The graduation rate reached about 39% for the level. That is, almost 4 out of 10 aged between 20 and 22 years who were admitted to the secondary level, managed to finish it. Also, access to and the manner in which it is coursed, and then finished, depends closely upon one's social origins, a situation which has not been reversed during the 2006-2011 period.

Access and graduation of post-secondary education

In 2011, 25% of young people between 20 and 21 years old attended post-secondary education, a number which has not improved since 2006.

3. ICT Overview of Uruguay

Since 2007, Uruguay’s ICT policies have been framed within a national coordination strategy called *Uruguay’s Digital Agenda (UDA)*. The latest plan, established for the 2011-2015 period, is oriented, implemented, and monitored by a National Information Society Council composed of stakeholders in government, academia, private sector, and civil society organizations. The document outlines a dynamic roadmap which sets out, among other things, government policies and objectives related to the development of Information and Knowledge Societies.

The 2011-15 UDA program focuses on social inclusion and strengthening national capacity through ICT. While the previous versions prioritized the creation of necessary infrastructure for new objectives to be achieved, the current UDA places special emphasis on generating direct and concrete benefits for citizens. The UDA provides 59 specific and measurable goals, corresponding to 15 objectives that are based on six strategic areas of action (in line with the World Summit on the Information Society – WSIS – and the Information Society in Latin America and the Caribbean Action Plan – eLAC): 1. Access, 2. Education and Culture, 3. E-government, 4. Productive Development, 5. Health, and 6. Environment.⁵

According to the United Nation’s International Telecommunication Union (ITU) *Measuring the Information Society* 2012 report, Uruguay ranks first in South America on the ICT Development Index (IDI).⁶

5. Uruguay Digital (2011), *Agenda Digital Uruguay*, http://uruguaydigital.uy/inicio/la_politica_digital/3_agenda_digital_uruguay

6. International Telecommunication Union (2012), *Measuring the Information Society*, http://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2012/MIS2012_without_Annex_4.pdf

Uruguay	Global Rank	South America Rank	ICT Development Index (IDI) 2011			
TOTAL IDI	50	1	IDI Indicators			
1. Access	48	1	Fixed-telephone subscriptions	Mobile-cellular subscriptions	% of households with computer	% of households with Internet
			28.5%	140.8%	62%	39.4%
2. Use	58	2	% of individuals using the Internet (2011 data)	Fixed-broadband Internet subscriptions	Active mobile-broadband subscriptions	
			51.4%	13.5%	9%	
3. Skills	37	2	Secondary Gross Enrolment Ratio	Tertiary Gross Enrolment Ratio	Adult Literacy Rate	
			90.2%	63.3%	98.3%	

According to the World Economic Forum’s (WEF) *The Global Information Technology Report 2013*⁷, Uruguay has demonstrated that it is not necessary to be one of the economic powerhouses of a region to take big steps toward integrating the country, particularly the government, into a knowledge-based society.

The WEF report concludes that overall, Uruguay’s efforts to expand ICT uptake in the population continue to improve and, for the first time, more than half of the population is using the Internet and benefiting from one of the highest school Internet access rates in the world. Uruguay’s experience offers some lessons that can benefit other countries currently implementing or planning to implement initiatives in this area:

1. Presidential proximity is crucial. In addition to political support at the highest level, proximity to the president is essential for managing the day-to-day activities of e-government. In this sense, the functional independence from the presidency has been instrumen-

7. World Economic Forum (2013), *The Global Information Technology Report 2013* http://www3.weforum.org/docs/WEF_GITR_Report_2013.pdf

tal to the success of Agency for the Development of e-Government and the Information and Knowledge Society (AGESIC) managing the operational portion of its agenda, as has been AGESIC's formal link to the Office of the President through the Deputy Secretary of the Office of the President, who is a member of AGESIC's board.

2. Excellent, well-qualified leaders are essential. Overcoming difficult challenges requires leaders with the best credentials. In the case of AGESIC, having a chief executive officer with business experience, deep ICT industry knowledge, and a history of working in public service has been a key factor in its success.

3. Local ICT businesses must be nurtured. The availability of a well-developed local ICT industry has been a cornerstone in Uruguayan progress toward a knowledge-based society. It has provided easy and immediate access to knowledgeable advice and qualified professionals to implement elements ranging from design to deployment and subsequent operation. By being local, these qualified ICT professionals not only can act faster but also can understand the local culture better, thereby increasing the chances of success in the implementation of e-government projects.

4. Analysis: Uruguay's Education and ICT Integration Policies

With the above background and overview, this section presents two themes of analysis: ICT integration policy development and implementation and teacher training. Concretely, three key policies are analyzed to demonstrate what has been accomplished, how and the lessons learned, including the enabling environment and factors that constrain or promote ICT integration initiatives:

- i. Uruguay's Digital Agenda: Internet for all and Digital TV
- ii. Uruguay's Digital Agenda: ICT in education and Education in ICT
- iii. CEIBAL, ICT integration and teacher training

i. Uruguay's Digital Agenda: Internet for all and Digital TV

<http://uruguaydigital.uy/>

As mentioned above, Uruguay's ICT policies are framed within the national coordination of Uruguay's Digital Agenda (UDA). The first of six strategic guidelines is *Access: "Connectivity for inclusion."* *ICT access* is defined as a necessary condition, though not sufficient, for social integration and bridging the digital divide. The universalization of broadband and digital TV is the main challenge facing the country in the coming years.⁸

Concretely, the first and second of the fifteen objectives of the UDA 2011-2015, are directly related to ICT access:

8. Uruguay Digital (2011), *Agenda Digital Uruguay 2011-15*, <http://uruguaydigital.uy/wps/wcm/connect/75ae69804ef9b192b8b8baf04da0faf/ADU+III+2011-2015.pdf?MOD=AJPERES>

Objective 1: Internet for all. “The universalization of broadband access in the twenty-first century is as important for growth and equality as electrical power and road infrastructure were in the twentieth century” (e-LAC 2011 - 2015). Its democratization is key for the success of the country’s economic and social development model, as well as to ensure a more just and inclusive society.

Specific Goals	Level of Achievement
a) 60% of households with broadband connectivity or Next Generation Access through Universal Internet Household Service by 2012 and 80% by 2015.	50.4% (12/2012)
b) 90% of small, medium and large enterprises with Internet connectivity by 2015.	56% (10/2012)
c) 300,000 households with broadband services based on Fiber-To-The-Home (FTTH) by 2015.	74,000 (03/2013)
d) Provide spectrum for 4G mobile broadband by 2015.	100%

Responsible Institutions: Ministry of Industry, Energy and Mining (MIEM)/National Telecommunications Directorate (DINATEL); National Telecommunications Administration (ANTEL); Regulatory Unit of Communications Services (URSEC).

Objective 2: National deployment of digital and interactive TV. The incorporation of Digital TV (www.televisiondigital.gub.uy) to the national broadcast system will not only provide improvement in image and sound quality but its greatest strength, from a democratic point of view, is that it will provide a major number of open signals with national coverage and allow for an interaction between senders and receivers of content.

Specific Goals	Level of Achievement
a) Carry out the digital transmission through a public open channel by 2012.	100%
b) Launch the first digital channel with national content by 2013.	100%

Specific Goals	Level of Achievement
c) Digital Television coverage for 60% of the population by 2014.	Not published
d) Complete the analogue switch-off by 2015.	Not published

Responsible Institutions: ANTEL; MIEM/DINATEL; URSEC; Ministry of Education and Culture (MEC); and Uruguay National Television (TNU).

The above mentioned advances of *Uruguay's Digital Agenda* primary strategic guideline on digital Access have enabled and created synergies with various ICT education integration policies presented below.

ii) Uruguay's Digital Agenda: ICT in Education and Education in ICT

<http://uruguaydigital.uy/>

Since 2008, the direction of Uruguay's education ICT integration policy has been framed by the General Education Law, which in *Article 21: On Equality of Opportunities and Equity*, states: "The State shall provide students who attend compulsory state education access to information and communication technologies, while promoting their maximum and meaningful use for education, and their appropriation by learners."⁹

In this context, the second of the six UDA strategic guidelines is *Education and Culture: "Building capabilities for the future."* The 2011-15 plan asserts that the use of ICT in education has started a social revolution in Uruguay and has laid the foundations for the establishment of a new type of citizenship, a digital one. This period is focused on continuing this digitalization process, expanding and leading it beyond the limits of the formal education system, thus

9. Ministerio de Educacion y Cultura (2008), *Ley General de Educación de Uruguay*, http://www.mec.gub.uy/innovaportal/file/431/1/ley_educacion.pdf

providing everybody with the necessary skills to achieve well-being in the information and knowledge society¹⁰

Concretely, the third and fourth of the fifteen objectives of the UDA 2011-2015, are directly related to ICT integration in education:

Objective 3: ICT for education. The CEIBAL initiative (explained below) has enabled an important step towards social inclusion and bridging the digital divide. The process initiated by this program is not over and this new plan aims to strengthen efforts to advance at all levels of education and strengthen the educational use of these tools.

Specific Goals	Level of Achievement
a) 100% of formal public education students up to 3rd year of middle school, with a personal computer by 2011.	100%
b) Every public primary and secondary school in towns with a population larger than 10.000 people, with fiber-optic connectivity by 2015.	27% (as of December 2012)
c) Distance learning system using tele-presence and video conference technologies with minimal coverage in every province capital, by 2013.	100%
d) Have a Digital Education Agenda of Uruguay, which describes the educational offering and targets set by all participants from both public and private sectors, by 2011.	100%
e) Develop the "Promoting Academic Inclusion Project" with its "Online Educational Assessment System" as well as specific proposals to enhance language proficiency and logical-mathematical reasoning, by 2013.	100%
f) Provide a high-speed optical network for academic and research projects and distance education all over the country (RAU2) and its connection to the CLARA Network for collaborative regional and international projects, by 2012.	Goal to be reformulated.

10. Uruguay Digital (2011), *Agenda Digital Uruguay 2011-15*, <http://uruguaydigital.uy/wps/wcm/connect/75ae69804ef9b192b8b8baf04da0fafa/ADU+III+2011-2015.pdf?MOD=AJPERES>

Responsible Institutions: MEC; Central Board of Directors of the National Administration of Public Education (CODICEN); Ceibal Center for Educational Support for Children and Adolescents; ANTEL; University of the Republic (UDELAR) / Central Service of University Informatics (SECIU); public and private educational institutions.

Objective 4: Education in ICT. This objective seeks to promote education in ICT at all levels and in different specializations, including the dimensions of education, research and continuing education courses. Training qualified human resources in ICT is crucial for developing an industry with potential and which delivers high quality jobs.

Specific Goals	Level of Achievement
a) Promote specialization studies in ICT at the different education levels, with projection across the entire territory.	See page 19 of ADU Monitoring of the 59 Goals Report to see all of the offerings in ICT specialization studies
b) Operate the Upper Tertiary Institute (ITS) in order to train specialized technicians in ICT by 2015.	The ITS has been reformulated and created within the new Technological University (UTEC) under the Law 19,043 ¹¹
c) Create a tertiary specialization in Medical Informatics by 2015.	100%
d) Foster research and collaboration projects among the different stakeholders, for the early development of advanced ICT skills ("Butia Project", among others).	100%

Responsible Institutions: MEC; CODICEN; UDELAR; public and private educational institutions; and ANTEL.

iii. CEIBAL, ICT integration and teacher training.

In 2006, the President of Uruguay, Dr. Tabaré Vázquez, announced plan CEIBAL, a 1-to-1 initiative destined to reach every student and every teacher in public schools across the country with a free lap-

11. Poder Legislativo, República Oriental de Uruguay (2012). Ley N° 19.043 Universidad Tecnológica, <http://www.parlamento.gub.uy/leyes/ AccesoTextoLey.asp?Ley=19043&Anchor=>

top. As a vanguard socioeconomic policy, CEIBAL has consolidated Uruguay as a global leader in reducing the digital divide and universalizing access to learning processes integrated with ICT.

CEIBAL, which stands for *Conectividad Educativa de Informática Básica para el Aprendizaje en Línea* (Educational Connectivity and Basic Computing for Online Learning), is jointly developed by the Ministry of Education and Culture (MEC), the National Telecommunications Administration (ANTEL), the National Public Education Administration (ANEP) and the Technological Laboratory of Uruguay (LATU), which, via Presidential decree, is responsible for the technical and operational implementation of the project.

The initiative is integrated nationally, by the Equity Program for Access to Digital Information (PEAID) and internationally, through the work carried out by One-Laptop-Per-Child (OLPC) non-governmental organization. OLPC is the creation of Nicholas Negroponte, the co-founder of the Media Lab of Massachusetts Institute of Technology (MIT), launched at the Global Forum in Davos, in 2005. CEIBAL is the first fully implemented OLPC initiative, and thus represents a model for analyzing lessons learned and the factors that promote ICT integration initiatives.¹²

Numerous internal and external evaluations have been conducted¹³, but perhaps none has been as important the latest one commissioned to Michael Fullan Enterprises, “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.”¹⁴

12. OLPC (2009) *One-Laptop-Per-Child Uruguay Overview*, <http://laptop.org/en/children/countries/uruguay.shtml>

13. Plan Ceibal (2013), *Evaluaciones*, http://www.ceibal.org.uy/index.php?option=com_content&id=908&Itemid=58

14. EduTech World Bank (2013), *Next steps for Uruguay's Plan Ceibal*, <http://blogs.worldbank.org/edutech/next-steps-for-plan-ceibal>

What follows are key excerpts of the Fullan report highlighting success and challenges of the three major phases of the plan:¹⁵

First phase (2006-2009): A matter of access.

- Implementation began in 2007 with a tender process for the provision and delivery of laptops to primary schools. The chosen laptop, the sturdy XO, won the tender by a far margin on price. By 2009, virtually all primary schools had their XOs, most with internet access. CEIBAL then extended the program to secondary schools, while also replacing the original internet connections with fiber optics, where available.
- Plan CEIBAL has widespread political and public support, with a 92% approval rating in public polls. Everyone we met in Uruguay was aware of and apparently supportive of CEIBAL, including those who had no connection with the education system.
- By 2012, 570,000 laptops had been distributed, covering all students and teachers. Virtually all schools (and thus all students and teachers) have internet access. Technology resources were also distributed to faculty and students in teacher training centers. While internet connections had been reported as unreliable in some schools, initial connections are being replaced by fiber optics, with a commitment to upgrade all urban schools by the end of 2013. Alternatives such as solar panels are provided for small isolated schools (*see the OEI's Lights for Learning project details at the end of the report*). Access points in several hundred community centers or other gathering spots also provide free internet connections.
- The cost of the CEIBAL program has been modest: the 4-year TCO (Total Cost of Ownership) is approximately \$400 for four years, \$100 per year per child. This figure includes the laptops, replacement of laptops after 4 years of use, repairs, internet costs, administrative costs, fiber optic costs, robotics, planned

15. Fullan, Michael et al. (2013) *CEIBAL Next Steps: Final Report*, <http://www.ceibal.org.uy/docs/FULLAN-Ceibal-English.pdf>

video conference facilities, the portal and platforms for Learning Management System as well as digital resources for mathematics, reading and other subjects. The cost figures also include initial training provided for teachers to familiarize them with the technology and how to use it.

- Training has been available for all teachers, at first using a cascade model in which a few people were trained and then trained others, now supplemented by ipersonal or online support in schools (see more on teacher training below).
- During the first phase of Plan CEIBAL there was clarity about the desired and intended outcomes – distribution of XOs to all students and teachers, provision of internet connections to schools and community centers and, as a result of such actions, reducing the ‘digital divide’ and promoting social inclusion.
- In short, the purpose of the first phase was access. Although the task was far from easy, problems were identified and addressed as they arose. When strategies proved unsuccessful, new strategies were developed. For example, the original plan had been for families to use the postal service to return damaged XOs for repair. For a number of reasons, the plan did not work; CEIBAL quickly moved to a fleet of repair vans that would go to schools to repair XOs and handle other technical issues. During this initial phase there were few education experts involved in Plan CEIBAL and support for users was geared almost entirely to solving technical problems.

Second phase (2010-2013): Adding support elements.

- In 2010, a parliamentary law established the Centro CEIBAL, shifting CEIBAL from a “project” to an established and still autonomous agency, protected from short-term political considerations.
- For this second phase of CEIBAL development, the distribution and connection infrastructure is in place and the social goal of equitable access to technology has been largely achieved. Now the focus has shifted from inclusion and access to the integra-

tion of technology into classroom practice, emphasizing the educational use of the technology.

- In early stages, teachers were certainly affected by all their students having XO's but they were not pushed to do anything in particular with the technology. Now they would be encouraged to participate more actively in this initiative; CEIBAL has developed resources and make these widely available to teachers and schools.
- Throughout this second phase, CEIBAL seems to have two objectives; first, supporting teachers/schools in the use of technology and, second, pushing/nudging for change in classrooms and in the broader system.

Next Phase 2013 – onward: Focus on quality implementation.

- The first two phases, 'A Matter of Access' and 'Adding Support Elements' have been appropriate startup actions to set the stage for further development. The next phase is the hardest one because it involves 'quality implementation'.
- We recommend that the system focus on four interrelated areas that will systematically support quality implementation and its spread across the whole system. These recommendations represent major changes in the roles and culture of the entire system. In this sense it will be a huge challenge to accomplish them. On the other hand we found a great deal of support for the direction and substance of the changes we recommend in this section.
- With clear leadership, and a responsive system much progress can be made in the next three years. It won't be easy but it could be enormously rewarding to be engaged in such a transformation of the system that will benefit the whole country.

The Report's four recommendations are:

1. Focus on a small number of ambitious goals as core priorities:
 - i) Literacy (both Spanish and English)
 - ii) Mathematics
 - iii) Re-

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

2. CEIBAL and education authorities at all levels to jointly develop the infrastructure to support implementation of the core priorities in a clear, specific, ongoing way.
3. Develop the roles of Inspectors, *Maestros de Apoyo CEIBAL* (Teachers who mentor their peers), Dinamizadores (external consultants for schools without *Maestros*), and school principals to support implementation in and across schools.
4. Develop the professional capacity of teachers, and related working conditions (e.g. small amounts of time) that would increase the capacity of teachers, individually and collectively to implement the core priorities.

The report concludes, that as CEIBAL has moved into the next phase of its work, its leaders, along with leaders in the education system, have increasingly focused on how technology use can change teaching and learning in positive ways, and how such improvement can be accomplished across the *whole school system*, not just in a few schools or in pilot programs in limited areas of the country:

- 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.

Finally, several studies have highlighted the importance given to the training of teachers, in particular the UNICEF study, *Five years of Plan CEIBAL: Something more than a computer per child*,¹⁶ in a chapter dedicated to the Role of the Teacher, explains:

- In order to overcome the initial difficulties related to the digital literacy of the teachers and promote good practices in education related to ICT, the authorities have offered a training plan that has been implemented gradually and has adapted different modalities according to demand, responding to difficulties and challenges presented, and placing emphasis on training the entire teacher community as a fundamental objective to ensuring the sustainability of the experience. CEIBAL has implemented a cascade modality in response to the organizational structure that characterizes the primary education system, in order to reach all teachers.

To summarize, the following actions were carried out:

- Face to face courses: activities planned according to the target audience and their prior knowledge. Begins with Sugar (graphic interface built-in to the XOs) and different basic use-in-classroom activities, and move onto programs that involve the development of logical-mathematical skills, such as the Etoys.
- Distance learning courses: the ability to access the Internet has increased remarkably in Uruguay and a means of reaching teachers are online courses. The asynchrony of the proposal offers advantages: participants regulate their time and space, and are accompanied by tutors with the relevant training.
- Creation of videos, tutorials, brochures and posters: qualified graphic design staff develops educational audiovisual material which facilitates the acquisition of concepts by the teacher.

16. UNICEF (2012), *Five years of Plan CEIBAL: Something more than a computer per child*, <http://www.unicef.org/uruguay/spanish/ceibal-web.pdf>

- Publications on the institutional portal and websites: the permanent link between teachers and the CEIBAL Center facilitates access to the technical modifications incorporated into the software. The information published on different websites and their free access allows teachers to analyze, compare and participate with the constant changes experienced by social knowledge.
- Training in educational institutions: the constant outreach and exchange with the staff is very important for the teachers. Therefore training and technical service are carried out in parallel, and trainers are taken to each school in the country to work directly with the teacher in classroom specific situations, to clarify their doubts and have the opportunity to access further knowledge.
- Training for teachers in private schools: with support from Plan CEIBAL, some private schools have incorporated digital classrooms so students can also access the XO's. These teachers working in the private sector receive special courses conducted within their schools.
- Ongoing coordination with different teaching subsystems: the first stage of the plan was developed in primary education, with teachers serving children between 6 and 12, and now the challenge is that of incorporating the plan at other levels. Therefore, the different educational levels have undertaken different teacher training plans to address the technical aspects of the plan.

According to the 2011 Plan Ceibal report, 25,000 primary middle school teachers and teacher trainers had been trained, either in person or online. In 2011, courses and other training initiatives reached 16,340 primary school teachers and 4,880 middle school teachers. The ORT University and the Faculty of Engineering of the University of the Republic (Udelar) is training 800 middle school computer science teachers in robotics. In turn, from the beginning have been formed Ceibal support teachers who are present throughout the day

school teachers and facilitators, who conduct dynamic activities the use of equipment on a rotating basis in escuelas. Since the plans inception, CEIBAL Support teachers have been trained to be present during the entire school day, and Teachers *Dinamizadores* carry out rotating activities on the dynamic use of the computers.

The 2009-2011 Annual Evaluation conducted by CEIBAL's *Monitoring and Evaluation Department*, analyzes the digital profiles of the teachers and the modality, valorization and demands of the training system. The report draws the following conclusions regarding the digital profiles of the teachers:¹⁷

- The teacher population does not present major limitations regarding access to computers and internet in their homes. Whereas only 44% of all uruguayan homes have internet connectivity, teacher connectivity in their homes reaches 89%.
- The integration of computer use by teachers is principally as a medium of personal communication and for the research of information on both a personal and professional level for classroom work (which is conducted by only one third of the teachers on a daily basis). 62% of the teachers use the XOs on a weekly basis to conduct class work (while 8% use it on a daily basis and 54%, a few times a week).
- The major computer skills of the teachers are those related to basic activities such as internet browsing, e-mail, and word processing; the same skills they possess with the XOs. In terms of programming skills, the students claim that they surpass their teachers.

With regards to the modality, valorization and demands of the training system, the report concludes:

- According to teacher surveys, the training modality they prefer is that which is conducted by their peers. This includes colleagues from the same centers, such as those through the CEIBAL Support Teachers, key figures of the process, and the

17. [http://www.ceibal.org.uy/docs/Evaluacion_Anual_2009-2011_Final_\(31012013\).pdf](http://www.ceibal.org.uy/docs/Evaluacion_Anual_2009-2011_Final_(31012013).pdf)

exchange of experiences with the integration of technology in learning processes.

- Both quantitative and qualitative results of the studies reflect the necessity of the teachers to receive more training, especially in the pedagogical and activities use of the XO's. When observing the different digital profiles it is recommended that methods be sought to focus on the customization of the teacher training.
- One of the main reasons why teachers prefer training from their colleagues in their schools is that they have little extra time for training purposes, and moreover, they prefer traditional face-to-face training modalities over the new virtual modalities offered via the technology.

An UNESCO-ECLAC study on plan CEIBAL and the main factors for ICT integration for educational usage, analyzes the preliminary results of CEIBAL's teacher training initiatives:¹⁸

- From the beginning, the Plan has accompanied teachers, providing training and support to make the process of incorporating the resource into the classroom with purpose and legitimacy. However, this process has not been linear nor even among all teachers and the idea has been to incorporate knowledge and experience to enrich teaching practices and students in the classroom.
- In terms of access to technology, we can say that the digital divide among primary teachers has been overcome – with 90% of them with at least one computer and 78% of them with access to Internet from home. The question is now about the level of mastery, use, and recognition of the applicability of the technology and Internet in the classroom.
- To conclude this chapter can highlight those factors on which the Plan Ceibal can pay special attention to the effects of making the greatest possible number of teachers become qualified

18. CEPAL (2013), *Principales determinantes de la integración de las TIC en el uso educativo : El caso del Plan CEIBAL del Uruguay*, <http://www.cepal.org/publicaciones/xml/7/49837/PrincipalesdeterminantesTIC-PlanCEIBAL.pdf>

users of technology, especially for their teaching. First Instead, the analysis shows that the valuation profiles personal and subjective (or prejudices) that teachers ICT has for education inhibits or promotes the use of the tool. Since negative assessment of this can often be related to the ignorance, the Plan may worry for reporting through lectures and workshops that enhance motivation and show the practical benefits that technology can bring to teaching. Consistent with this, the profiles analyzed showed the importance CEIBAL general support in terms of training and presence in the school of people who can guide and act as supports for this type of activities. Reinforcing this so massive and often is key, at least in the initial stages, until the remaining capacity installed in schools. Finally, the Plan must consider the motivation and training of teachers often not enough. Furthermore, it is essential that the school is in an environment conducive to the pedagogical innovation technology. In this sense, the assessment and training of managers is also a key factor to facilitate or hinder the process of technology appropriation.

5. Uruguay's Regional Integration and South-South Cooperation in ICT and Education

As the first country to fully and successfully implement a 1-to-1 program, Uruguay has also developed a cooperation policy for sharing its experience and expertise internationally. Under the umbrella of CEIBAL, the Foreign Service policy aims to support and advise governments, foundations and civil society organizations, among others, in the implementation of plans for including ICT in education.¹⁹

With more than five years of lessons learned from the challenges posed by an ambitious plan with complex characteristics, Uruguay has become a key global partner for planning and implementing high impact ICT and educational projects. To do so, and considering the needs of countries that have sought advice, Plan Ceibal has created a consulting program that encompasses advisory work ranging from the planning and design of a project, the successive stages of implementation and development, to the evaluation and optimization. See this [video](#) for more complete vision CEIBAL's Foreign Service and this [website](#) to read more about the several international experiences of the program.

To consolidate and strengthen Uruguay's growing international cooperation, in 2010 the President of Uruguay Jose Mujica enacted a Law that created the Uruguayan International Cooperation Agency (AUCI) to coordinate all official development aid received and disbursed by the Uruguayan government.²⁰ The AUCI has carried out numerous activities to promote technical cooperation in the field of

19. Plan Ceibal (2012), *Plan CEIBAL Services*, <http://servicios.ceibal.org.uy/en/>

20. AUCI (2009), *Acerca de la AUCI*, <http://www.auci.gub.uy/Acerca-de-la-AUCI/>

ICT and education. For example, in 2012 Uruguay hosted an international forum on Digital Citizenship for Development and Social Inclusion through the use of ICT. More than 900 people participated from this Forum, including President Mujica, which highlighted the successes of CEIBAL and its South-South and Triangular Cooperation Program.²¹

Since 2012, AUCI has been the headquarters for the Executive Secretariat of the Program to Strengthen South-South Cooperation of the General Ibero-American Secretariat (SEGIB). The Technical Unit of the Program operates within the orbit of the AUCI offices. In 2012, the UNDP and the Panamanian government hosted the *Knowledge from the South* fair, a regional South-South Cooperation (SSC) forum that brought together the cooperation offices and agencies of Latin American and the Caribbean countries to share and advance South-South Cooperation experiences. In the context of the Fair, the former president of Uruguay, Vázquez presented Plan CEIBAL, underlining the international importance the Uruguayan government gives to the initiative.²²

Earlier this year, the Organization of Ibero-American States for Education, Science and Culture (OEI) announced that the national office in Montevideo will launch a headquarters for coordinating activities among the MERCOSUR member²³ countries by 2014.²⁴ Further collaboration in the field of ICT and education between the OEI and Uruguay was consolidated when they signed an agreement with the Spanish *Fundación Elecnor*, in the framework of *Lights for Learning*, to provide solar energy to all remaining schools without electricity in Uruguay, while working with Plan CEIBAL to distribute the computers to every teacher and student, while ensuring

21. AUCI (2012), Event: "Ciudadanía Digital" (Digital Citizenship): conclusions about Plan Ceibal in Uruguay, <http://tinyurl.com/mb8mrb3>

22. Cooperación Sur-Sur (2012), Programa Iberoamericano de Cooperación Sur-Sur presente en la Feria Saber del Sur, <http://tinyurl.com/lbqyt4c>

23. ^

24. OEI (2013), La OEI abrirá una sede regional para Mercosur en Uruguay, <http://www.oei.es/noticias/spip.php?article12442>

connectivity to overcome the remaining digital gap.²⁵ Launched by the OEI in 2010, *Lights for learning* aims to provide electricity through solar panels and computers with the appropriate satellite/telephone internet connection in more than 66,000 schools in the Ibero-American region over the next 3 years. For more information on this ambitious project visit: <http://lucesperaaprender.org>.

25. OEI (2013), La Organización de Estados Iberoamericanos y la Fundación Elecnor llevarán energía a 90 escuelas de Uruguay, <http://www.oei.es/noticias/spip.php?article12614>

About ADEA

ADEA

ADEA was founded in 1988 to coordinate external aid supporting education in Africa. It has since grown from a donor-driven platform to a vibrant network of African education and training Ministries, bilateral and multilateral development agencies, educational researchers, practitioners and experts, from Africa and around the world.

Hosted by the African Development Bank (AfDB) since 2008, the network aspires to achieving the vision of high quality education and training geared towards the promotion of critical skills and competencies for Africa's accelerated and sustainable development.

In 2013, the African Union's Heads of State endorsed the Strategic Framework developed by ADEA to guide the transformation of African education and training systems.

ADEA also supports the African Union in the implementation of the Second Decade of Education Plan of Action programs and priorities. The MoU between ADEA and the African Union was renewed in March 2014.

ADEA programs are implemented by the ADEA Secretariat, which is based within the AfDB, and by its Working Groups, Task Forces and Inter-Country Quality nodes, which address specific themes and challenges in the education field.

The ADEA Task Force on ICT

The Task Force was created by ADEA in December 2011 in response to countries' expressed need to be more effective in harnessing ICT to enhance education and training, build knowledge societies and contribute to accelerating Africa's sustainable development.

The Task Force:

- Brings together actors from the education community and the private sector;
- Encourages national policies that promote cross-sectorial cooperation and integrated approaches that support innovation and change.
- Informs and frames policy dialogue through the analysis of country experiences and lessons learned;
- Fosters interaction and partnership among all players - ministries, the IT community and the private sector, funding agencies, civil society and grass-roots organizations – that have a stake in developing sustainable solutions;
- Builds the capacity and skills needed to accelerate the ICT integration process among ministry, administrative and teaching personnel.

For more information consult the ADEA web site: www.adeanet.org

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