

ICT in Education in Rwanda

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Source: *World Fact Book*¹

Please note:

This short *Country Report*, a result of a larger *infoDev*-supported *Survey of ICT in Education in Africa*, provides a general overview of current activities and issues related to ICT use in education in the country. The data presented here should be regarded as illustrative rather than exhaustive. ICT use in education is at a particularly dynamic stage in Africa; new developments and announcements happening on a daily basis somewhere on the continent. Therefore, these reports should be seen as “snapshots” that were current at the time they were taken; it is expected that certain facts and figures presented may become dated very quickly.

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Overview

ICT is central to Rwanda's Vision for 2020, and ICT in education is one of the core pillars of the country's National Information and Communications Infrastructure Policy and Plan, adopted in 2000. Tremendous progress has been made since then and the country continues to receive plaudits and support from its development partners. The pace of development of a national ICT infrastructure is remarkable as is the progress within the education system on disseminating computers and providing connectivity and teacher training. Moreover, there is a nationwide effort to provide universal access to both infrastructure and the Internet in order to facilitate ICT4D in the broadest sense.

Country Profile

Rwanda, a landlocked country with a painful history, is one of the world's poorer nations. However, it has made remarkable progress over the last decade in economic growth, increases in per capita income, and decreases in poverty levels. As well, it boasts the highest proportion in the world of female members of parliament at 48%. Rwanda is well on the way to meeting the Millennium Development Goals (MDGs) for education and is successfully containing the spread of AIDS. Over one-third of the national budget is spent on health and education.²

Table 1 provides some selected socio-economic indicators for the country.^{3,4}

Table 1: Socio-economic Indicators: Rwanda

Indicator	
Population	9 million
Languages	English, French, Kinyarwanda, Swahili
Adult literacy rate	64.9% (age 15 and over)
Economic activity 2005 (percent of GDP)	Agriculture: 42.2% Industry: 20.2% Services: 37.7%
Human Development Index	158 (out of 177 countries)
Human Poverty Index	67 (out of 102 countries)
Per capita gross national income (US dollars)	\$200 (2003); \$210 (2004); \$230 (2005)

According to the World Bank,⁵ Rwanda receives about 60% of its annual public spending from about 10 significant bilateral and multilateral donors. About half of this amount is provided through budget support from the African Development Bank, DFID, the European Commission, Sweden, and the World Bank. The remainder comes via projects using parallel delivery mechanisms and donor procedures that are funded by the above donors as well as by Belgium, Germany, the Netherlands, the UK, the USA, and various

UN programmes and Global Funds.

The 2000 report from the Ministry of Finance and Economic Planning, Rwanda Vision 2020, was adopted by the government in 2002. It sets out a vision for the country along with strategies that focus on education and human resource development through the use of ICT.⁶

The Education System⁷

Three years of pre-primary education is available in Rwanda, followed by six years of free compulsory primary education. Fees for primary education were abolished in 2003. As mentioned previously, Rwanda is well on the way to meeting the education MDGs, with net primary enrolment at 94%, and the ratio of girls to boys enrolled in primary schools at 100% (see Table 2 below).

Secondary education is divided into two levels. The lower level is a three-year programme of general studies for all students following primary education. The higher level, also three years, offers both academic and technical/vocational options.

Tertiary education is offered by the country's six public and 14 private universities as well as by specialised public and private institutes. The National University of Rwanda (NUR) and the Kigali Institute of Science and Technology (KIST) are particularly noteworthy in terms of ICT in education – NUR because of its academic excellence in ICT and KIST because of its ICT training mandate and its partnership with the African Virtual University (AVU).

While most schools and institutions of higher education come under the jurisdiction of the Ministry of Education, the churches are also significant providers.

Table 2 provides a quantitative perspective of some selected system indicators.⁸

Table 2: Selected Education Data

Indicator	
Primary enrolment (% gross)*	110 (2003); 119.2 (2004)
Secondary enrolment (% gross)*	11 (2003); 14.3 (2004); 16 (2005)
Primary completion rates (% of 6- to 12-year age group)	22.4 (2003); 37.4 (2004)
Tertiary enrolment (% gross)*	1.7 (2003) 2.7 (2004)
Ratio of girls to boys in primary and secondary (%)**	99 (2003); 100 (2004)

*Percent of gross is the number enrolled as a percentage of the number in the eligible age group.

**Ratio of girls to boys is the percentage of girls to boys enrolled at primary and secondary levels in public and private schools.

ICT Policies

The Government of Rwanda has set a national goal that the country will achieve middle-income status by 2020 based on an information-rich, knowledge-based society and economy, achieved by modernising its key sectors using ICT. This vision, developed through a national consultative process that began in 1998, is the driving force for policy development across government ministries, public institutions, and with the country's development partners.

National

Rwanda promulgated its national ICT policy in 2000. It is based on a document that was released in 1999 for national debate and consultation, "ICT-Led Integrated Socio-economic Development Framework." The policy is being implemented in four 5-year rolling plans, which are referred to as the National Information and Communications Infrastructure (NICI) plans. Phase One (NICI-2005) began in 2001 and concluded in 2005. The development of the plan for Phase Two (NICI-2010) built on the achievements of Phase One. The Phase Two Plan,⁹ launched in 2006, is structured into sub-plans, each representing one of the following 10 pillars:

- ICT in education
- Human capacity development
- Infrastructure, equipment, and content
- Economic development
- Social development
- E-government and e-governance
- Private sector development
- Rural and community access
- Legal, regulatory, and institutional provisions and standards
- National security, law, and order

The partners working with the Government of Rwanda in the development of its national ICT policies include the Economic Commission for Africa, USAID, UNDP, and the Carnegie Foundation.

The structures¹⁰ to develop and monitor the NICI plans were established in Phase One. These include the National Information Technology Commission (NITC) and the Rwanda Information Technology Authority (RITA). The first, NITC, is chaired by the president; its mission is to lead the process of creating the Rwandan information society and economy in line with the aspirations of the 2020 Vision. It is also responsible for policy and programme monitoring and evaluation. RITA is an autonomous agency under the direct supervision of NITC. It is the main body in charge of actually implementing the ICT policies and all of the associated projects and programmes – including human development. It also acts as the secretariat for NITC and has administrative links and working relations with the Office of the President, the Prime Minister's Office, and the Ministry of Public Works, Transport and Communications (the sponsoring ministry). RITA's primary role is to enhance public awareness about ICT and, through its National

Computing Centre, provide consulting services to the government and to public and private sector organisations. RITA is implementing its mandate through a series of strategies that relate to each of the four NICI plans.¹¹

The Rwanda Development Gateway Group¹² is another facet of the national facilitating structure. This is a group of three “ICT for development” initiatives under the Ministry of Education, Science, Technology and Scientific Research (MINEDUC) being funded by the government, which include the following:

- The Rwanda Development Gateway (RDG), hosted by the National University, which is establishing a national portal to provide one-stop shopping for information on Rwanda and to be the country’s Web interface to the rest of the world
- The Centre for Geographic Information Systems and Remote Sensing, also hosted by the National University
- The Regional ICT Training and Research Center (RITC),¹³ hosted by KIST, which provides ICT training for government staff, teachers, school leavers, and staff in institutions of higher learning

Education sector

ICT in education policy, along with detailed implementation strategies, are defined in each of the quinquennial NICI plans for action by the Ministry of Education – supported and monitored by the national facilitating agencies described above.

The sub-plan for education in NICI-2010 sets out a number of policy action items and associated planned actions that include time frames, budget estimates, and expected benefits. The planned actions, with leadership assigned to the Ministry of Education (sometimes in collaboration with other agencies), are listed below. Some of these are new, while others relate to planned actions in NICI-2005 that have been updated and revised. Others have been rolled forward from the NICI-2005 plan into the NICI-2010 plan because implementation is continuing.

- Train primary and secondary teachers on ICT in education
- Establish a national library network
- Develop new e-learning content
- Implement an educational management system (EMIS)
- Survey educational software appropriate for Rwanda and translate to Kinyarwanda
- Convert existing computer-based training and e-learning content to Kinyarwanda
- Develop programmes to promote the acquisition of computer equipment by educational institutions
- Develop a comprehensive policy on computer education in schools
- Develop a national SchoolNet to provide access to the Internet for schools, facilitate sharing of learning resources, facilitate electronic distance education within the school system, and link Rwandan schools with schools internationally
- Develop a national computer curriculum for primary and secondary schools and co-ordinate its implementation
- Train a critical mass of computer literate teachers

- Develop a national programme to speed up the deployment and use of ICTs in higher education institutions (A specific component is the establishment of a Rwandan Academic Research Network that links all institutions and provides a gateway to the Internet.)
- Develop a national electronic distance education and training programme that supplements and complements campus-based education at all levels, facilitates lifelong learning, and encourages in-service training in both the public and private sectors
- Develop special ICT-in-education initiatives for academic exchanges and twinning, implementation of the SMART schools concept, and penetration of ICT into rural schools
- Establish a regional information technology training and research institute to serve Rwanda and the sub-region

The Ministry of Education has begun work on many of these action plans and in March 2006 tabled a draft ICT policy that identified the following four areas of focus:

- Developing an understanding within the system of the value of technology and the need for investment
- Developing procurement and installation strategies
- Implementing an EMIS
- Developing and managing content and integrating it into the curriculum

The Kigali Institute of Education (KIE),¹⁴ started in 1999, with funding from the government and numerous donors such as the World Bank, the Swiss Co-operation, DFID, USAID, and UNESCO, has become an important teacher-training institution. KIE's mission is to train secondary school teachers and faculty in teacher-training colleges and technical schools.

Infrastructure

National

Creating access to ICT infrastructure is at the heart of Vision 2020, and the government is being widely recognised and applauded for the achievements since the promulgation of its ICT policy and plans.¹⁵ However, there remain plenty of challenges: the extent and quality of ICT infrastructure and access to the Internet varies widely, computer hardware is in short supply, the skilled resource pool is small, and financial resources are scarce.

Findings from a recent feasibility study¹⁶ on community information centres (CICs) are indicative of the task ahead. Although the idea of setting up CICs appeals to Rwandans, the study findings reveal that only 7% of the population have ever used the Internet, and 71% have never even heard of it – not surprising given that the vast majority of Rwandans live in rural areas.

Table 3 provides a snapshot of the state of national ICT infrastructure as of 2004 (note, however, that there has been considerable development over the last two years).

Table 3: ICT in Rwanda^{17,18}

ICT	
Telephone main lines (per 1,000 people)	2 (2000) 3 (2004)
Mobile subscribers (per 1,000 people)	5 (2000) 16 (2004)
Population covered by mobile telephony (%)	65 (2004)
Internet users (per 1,000 people)	1 (2000) 4 (2004)
Personal computers (per 1,000 people)	4 (2004)
Households with television	2 (2000) 2 (2004)
VSAT providers (broadband)	15
Private FM stations	8
Private TV stations	2

Rwanda Terracom, founded in 2004 as a private company, has been the national telecom service provider and has been developing a state-of-the-art fibre optic network connecting schools, hospitals, and government buildings in Kigali.¹⁹ The next step will be to extend the network to the next four largest cities – more than half the population. Base stations will allow wireless connections to the cable from several kilometres away. Anyone who is patched in will benefit from data transfer speeds of up to 2 Mbps that will offer phone, Internet, and television services. This network, together with the highest VSAT density of any African country, will enable every household to have a mobile phone within the next two years. In July 2007, the government of Rwanda announced that it will take over Terracom, buying back all shares in Terracom from its private owners and changing its name to Rwandatel.²⁰ While not the primary reason for this decision, government dissatisfaction with the slow pace of the roll-out of Internet connectivity to schools was a contributing factor.

Education

In 2000 just one school in the country had a computer. Six years later over half of primary and secondary schools have been equipped with hardware, over 2,000 teachers have received ICT training, and all public schools are expected to join the information superhighway by the end of 2008. Already, out of the 400 secondary schools that have been fully equipped, 39 of them having wireless Internet access.²¹ The national SchoolNet project included in the NICI-2010 plan is intended to be the vehicle for school connectivity.

A non-binding schools agreement has been signed with Microsoft for the use of their software in Rwandan schools at a significantly reduced annual fee from their usual

commercial offerings. This will extend to the use of the Microsoft XP operating system and Microsoft Office.

At the tertiary level, all universities and institutes have computers. The two primary universities, NUR and KIST, are the best equipped with ICT infrastructure consistent with their mandates to provide leadership in achieving Vision 2020. However, all universities are independently connected to the Internet in various ways such as fibre optic cable, wireless broadband (Wi-Fi), leased lines, and VSATs. There is no direct inter-university connectivity, and most Internet traffic is focused on international Web sites that are costly and slow to access due to expensive and limited international bandwidth. However, this is about to change with the development of the Rwanda Education and Research Network (Rwednet),²² which will enable broadband access for all higher education institutions and research centres. As well, there is hope that, with assistance, this access can be expanded to link secondary schools and, potentially, primary schools as well. Rwednet will be part of the UbuntuNet Alliance for Research and Education Networking, an association of national research and education networks (NRENs) across Africa.

Current ICT Initiatives and Projects

Table 4 summarises the current and recent ICT initiatives and projects in Rwanda.

Table 4: ICT Initiatives and Projects

<p>Project: Market and employment information dissemination via FM radio stations throughout the country.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> FM coverage is excellent and radios are generally affordable. FM stations provide this service as a contribution to poverty reduction. • <i>Geographic scope and time frame:</i> Countrywide; ongoing. • <i>Contact:</i> Gahamanyi Jacob, www.rwandagateway.org
<p>Project: HIV/AIDS and other health information is provided to clinics and health workers around the country via cell phones using an Internet platform.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> TRACnet, under the leadership of the Ministry of Health, and the Centre for AIDS Treatment and Research (TRAC), are the primary organisations. RwandaTel and MTN-Rwandacell provide toll-free numbers and donate network time to support TRACnet. • <i>Geographic scope and time frame:</i> National; launched in 2005. • <i>Contact:</i> www.earthinstitute.columbia.edu/news/2005/story10-28-05.html
<p>Project: Distance education programmes are offered by the AVU in collaboration with NUR and KIST. KIE hosts a programme for training under-qualified secondary school teachers. Foreign institutions offer programmes in information management, information technology, and business management</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> In addition to the AVU and its Rwandan partners, the

<p>University of South Africa, in partnership with KIE, and the University of Australia (with KIST), offer programmes. Others are offered directly by European and American institutions.</p> <ul style="list-style-type: none"> • <i>Geographic scope and time frame:</i> National;; ongoing. • <i>Contact:</i> Rwanda institutions and Ministry of Education
<p>Project: Rollout of computers to secondary schools: 2,100 computers have already been distributed to secondary schools, and another 2,200 are ready for distribution. The target is to continue distribution at 300 computers per month.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> Ministry of Education; Rwanda Network Computer, a Kigali based company, is building the computers. • <i>Geographic scope and time frame:</i> National; launched in 2005. • <i>Contact:</i> Ministry of Education
<p>Project: ICT training in basic skills for 3,000 secondary school teachers carried out in partnership with Microsoft Partners in Learning (PIL) using a trainer-of-trainers model.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> RITC and PIL managed the project. PIL, Microsoft Emerging Markets Team, RITC, and the Ministry of Education provided the funding. • <i>Geographic scope and time frame:</i> A national project in 2005. • <i>Contact:</i> Ministry of Education
<p>Project: In-depth ICT training 1,000 secondary school teachers: The objective was to following on from the basic skills training to train two teachers per school with higher-level skills such as troubleshooting and fault-finding. These teachers are expected to train other teachers in the schools.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> RITC managed the programme with funding primarily from the Ministry of Education. • <i>Geographic scope and time frame:</i> National; 2006. • <i>Contact:</i> Ministry of Education
<p>Project: Content development: Fifteen NCDC curricula developers were selected for training in the development of digital curricula. Trainers from World Links provided the first course, which was followed by an intensive six-day course using expert trainers from Learnthings that included a follow-up six-month mentoring programme of on-line support.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> The NCDC managed the project with funding from PIL. Discussions have also been initiated with SUN Microsystems Global Education Learning Community (GELC) for the use of open source curricula content software. • <i>Geographic scope and time frame:</i> Institutional (NCDC); launched in 2006. • <i>Contact:</i> NCDC
<p>Project: Rollout of computers to primary schools: Two desktop computers were provided to 98 primary schools with power, and one laptop plus solar supply provided to another 1,018 primary schools without power. A rollout of up to five computers in each of the 2,200 primary schools in Rwanda is planned over a three-year period beginning in 2007.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> World Links provided the first phase, and costing of phase 2 is underway. UNESCO, the World Bank, and the African Development Bank have supported the rollout of computers in schools generally, particularly to assist in the teaching of science. • <i>Geographic scope and time frame:</i> National; 2002 to 2005. • <i>Contact:</i> Ministry of Education.²³

<p>Project: Training of primary school teachers in computer skills: Two teachers in each of the schools equipped with a computer were trained in basic computer literacy who then trained colleagues. A total of 2,216 teachers were trained.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> World Links provided the training in collaboration with the Ministry of Education (MINEDUC). This training programme will be continued in line with the MINEDUC programme to roll out computers to primary schools. • <i>Geographic scope and time frame:</i> National; 2002 to 2005. • <i>Contact:</i> MINEDUC
<p>Project: Microsoft Pathfinder programme: A new initiative from Microsoft for a pan-African partnership network for sharing knowledge and providing training in ICT.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> Microsoft, RITA, and MINEDUC. • <i>Geographic scope and time frame:</i> To be announced. • <i>Contact:</i> RITA
<p>Project: Phase 1 of NEPAD e-Schools Initiative: A demo project that includes six schools in Rwanda. Private sector consortia are providing the components to equip the schools with the latest ICT technology, including full Internet capability, a media centre, content, and e-curricula.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> CISCO and Microsoft • <i>Geographic scope and time frame:</i> Six sites are being targeted from 2005 to 2007. • <i>Contact:</i> MINEDUC
<p>Project: Hundred dollar laptops: The government will collaborate with the One Laptop Per Child (OLPC) non-profit association to test the applicability of the technology. There will be no cost to Rwanda.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> Ministries of Infrastructure and Education and the Minister of Science and Technology and Research in the President's Office. • <i>Geographic scope and time frame:</i> TBA • <i>Contact:</i> MINEDUC
<p>Project: KIST: an intensive programme to train ICT technicians to maintain hardware, software, and networks, aiming to build local capacity to maintain the ICT infrastructure through staff upgrading. KIST has also introduced a CISCO Network Academy Programme and Microsoft Certification Programme.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> In collaboration with DFID. • <i>Geographic scope and time frame:</i> National; ongoing. • <i>Contact:</i> www.schoolnetfrica.net/1409.0.html
<p>Project: A programme to establish telecentres in the country has been launched as a way of improving access to information, to enhance educational standards, and to foster human resource development.</p> <ul style="list-style-type: none"> • <i>Organisation(s)/funding sources:</i> RITA is the lead agency. The government has earmarked USD\$1 billion. • <i>Geographic scope and time frame:</i> National; began in 2006. • <i>Contact:</i> http://english.peopledaily.com.cn/200603/29/eng20060329_254425.html
<p>Project: Support to village phone operators (VPOs) to operate businesses where no telecommunications services exist. The concept, pioneered by the Grameen Foundation, assists</p>

the VPOs to rent their phone to their community on a per-call basis. They provide affordable rates to their patrons while earning enough to repay their loans and earn profits.

- *Organisation(s)/funding sources:* Village Phone Rwanda was created as a joint venture between the Grameen Foundation and MTN Rwanda.
- *Geographic scope and time frame:* Currently located in 14 of 30 districts. The goal is to have over 3,000 VPOs by 2009.
- *Contact:*
www.grameenfoundation.org/where_we_work/sub_saharan_africa/rwanda/village_phone_rwanda

Implementing ICT in Education: What Helps and What Hinders?

The core factors that influence the adoption and diffusion of ICTs in education have been identified in many studies and project reports such as the UNESCO *Meta-survey on the Use of Technologies in Asia and the Pacific*²⁴ and, in the context of East Africa, by IDRC in its thorough analysis of ICT policy-making in the region.²⁵ Two other studies that have discussed some of these factors in the higher education sector are those carried out by the United Nations National University²⁶ and by the African Virtual University.²⁷ What emerges from these analyses is that the factors are essentially the same in both developed and developing economies, although they differ in terms of importance depending on which side of the “digital divide” they are viewed from. What differentiates the rate of adoption and diffusion is not the factors at play, but rather the degree to which they have been developed or are present in a given country.

Table 5 provides a summary of the current stage of ICT development in Rwanda in terms of enabling or constraining features in the education system.

Table 5: Factors Influencing ICT Adoption

Factors	Enabling Features	Constraining Features
<i>Policy framework and implementation plans</i>	The scope and detail of the NICI plans for achieving Vision 2020 provide clear, meaningful direction and have captured a broad base of donor support.	
<i>Advocacy leadership</i>	The president is providing clear visionary leadership and has strong support from his colleagues in government and from officials at all levels.	Long-term success will depend on continuing stability and support for Vision 2020 and the spending priorities needed to achieve it.
<i>Gender equity</i>	Strong emphasis on the NICI plan. Evidence is that goals are	Female participation rates drop off at tertiary levels.

	being met in primary and secondary schools. Several non-formal education projects target rural women.	
<i>Infrastructure and access</i>	The rate of development is remarkable and the goal of universal access within the NICI-2010 plan has wide appeal.	Rwanda is still a predominantly rural society with lack of access to electric power, equipment, and trained teachers in schools, and lack of awareness of ICT generally.
<i>Collaborating mechanisms</i>	The NICI planning process, although managed centrally, is highly participatory with implementation decentralised to facilitating structures such as RITA, RITC, the line ministries, and various lead institutions such as the NUR.	
<i>Human resource capacity</i>	The NICI-2010 plan emphasises the importance of developing this capacity.	People with the requisite skills to contribute to the development processes are currently in short supply.
<i>Fiscal resources</i>	The government's spending priorities are consistent with its vision and implementation plans.	Rwanda is a poor country so it remains dependent on donor partners.
<i>Learning content</i>	Development and acquisition of digital content in all official languages is identified as a priority in the NICI-2010 plan.	Digital content is currently lacking.
<i>Procurement regulations</i>	The government has put policies in place that encourage and enable procurement domestically and from international sources.	
<i>Attitudes</i>	Strongly positive within government and the education system.	Most rural Rwandans are unaware of ICT and its potential for development.
<i>Sustainability</i>	Plans are based on achieving a sustainable, ICT-based economy.	Rwanda will continue to need the support of partners until those goals are achieved.

Notes

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