ICT in Education

MASTER PLAN

MINEDUC
MINISTRY OF EDUCATION
Republic of Rwanda

Introduction

Rwanda Vision 2020 aims at moving Rwanda from "an agriculture based economy to a knowledge-based society" and middle-income country 2020. Education is a key sector to this social and economic transformation, tapping into the limitless potential of an empowered population. At the same time, the Vision 2020 places ICTs at the heart of the transformation across all sectors. The use of ICT in education is seen as a strategic lever for achieving this transformation.

The Education Sector Strategic Plan (ESSP) calls for 3 strategic goals to be addressed for education to fulfill its potential in the development of Rwanda.

- To expand access to education at all levels:
- To improve the quality of education and training:
- To strengthen the relevance of education and training to the labor market including the insertion of 21st century skills

Technology in education can be used to achieve these goals and address the key challenges of access, quality, equity, relevance and management efficiency with tangible advantages that can be seen and measured in numerous ways.

At primary and secondary levels, gross enrolments ratios are growing and more children are in school. However, the number of trained teachers to sustain these enrolment ratios is still low. At higher education levels, the levels of enrolment are still very low. Here technology to support Open and Distance Learning (ODeL) can play a critical role train new teachers, up-skill existing unqualified teachers and increase access to tertiary education.

While more children are enrolled in basic education, the key challenge remains the quality of education they are getting. Here technology can be used to improve the quality of teaching and learning materials through the use of digital learning resources. Multimedia interactive digital content can be used to motivate students, improve conceptual understanding and retention of key topics. ICTs can help simplify the use of regular assessments to keep track of student performance. ICTs can help with real time data gathering of enrolment, assessments, performance to improve decision making and effective management of the education sector leading

to informed prioritization and allocation of resources. ICTs can also be used to strengthen teacher professional development thereby contributing to the improvement of quality of education.

Lastly, students must be prepared for the 21st century and given abilities needed to succeed and thrive in today's complex, technology-based global economy, and to be active 21st century global citizens. Some of these skills include Critical Thinking, Problem Solving, Communication, Collaboration and Visualization. Technology in education enables the development of these important skills.

Why we need a Master Plan for ICT

ICTs are expensive and complex to integrate in education but the payoff and benefits are transformational. To realize these benefits, a carefully considered approach is required.

The Master Plan is a blue-print or roadmap for using ICTs to transform education in Rwanda. It describes the overall plan for how technology will be integrated and used by schools, teachers, student, administrators and even parents to increase access, improve the quality and prepare students for the 21st century. The Master Plan will be the guide for setting Priorities, focusing Resources, align all Stakeholders, tracking performance and achievements and managing change.

The Master Plan is not starting from scratch; rather it builds on the lessons learned over the last 8 years of ICT integration in Education in Rwanda and takes into consideration new changes in education and the ICT environment in Rwanda. Having a documented blue-print will lead to efficiency and better effectiveness of interventions.

The emerging context for ICT integration

The Master Plan is aligned to the Smart Rwanda Master Plan, the Education Sector Strategic Plan (ESSP) and the Draft ICT in Education Policy. The timing for the development of the Master Plan is also opportune with 3 recent developments providing a "perfect storm" to take ICT to the next level:

1. The roll out of broadband across the country by 2017 will solve the connectivity problem and allow the adoption of emerging and

revolutionary cloud based technologies for education as called for in the Smart Rwanda Master Plan. These technologies makes it possible to develop and deliver digital learning materials to students any-time and anywhere, to deliver an individualized and adaptive digital learning experience and to implement an effective education management systems.

2. The contract with Positivo BGH to set up an assembly plant in Rwanda will secure a reliable source of devices for education for the next 5 years starting in 2015.
3. The new curriculum recently launched by REB, to be implemented starting 2016, provides an opportunity to deeply integrate technology, rethink the approach to teaching and learning and revolutionize the teaching materials switching from print to digital learning materials. Teaching can change from a teacher-centered (where the teacher has all the knowledge and transmits it to students) to a learner centered approach where the student is at the center of and is the focus of teaching and learning.

In addition, there is growing interest from development partners and the private sector to support Rwanda to integrate ICTs in all sectors. Therefore, public-private partnerships can be formed to provide additional financing, expertise and resources for the successful integration of technology in education.

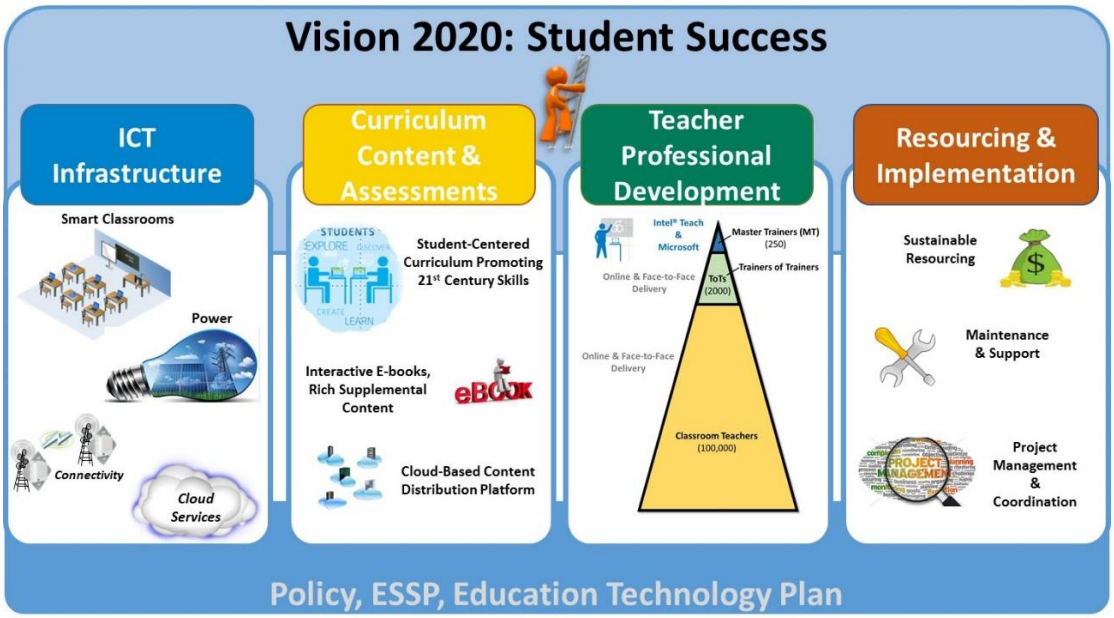
The key pillars of the Master Plan

To achieve successful education transformation, the Master Plan calls for investments in a number of important pillars described and shown in the diagram below.

1) **Policies:** Clear and effective policies that encourage and empower teachers and students to use ICT as an integral part of the education process.
2) **Leadership Development:** Leadership development in the ministry and among school leaders that helps, leads, supports and encourages the regular use of ICT in schools and classrooms.

3) **ICT Infrastructure:** is the scalable ICT infrastructure, broadband and user support required to transform our schools into “Smart Schools” (in line with the Smart Rwanda vision). ICT infrastructure includes student and teacher devices with appropriate education software, Interactive White Boards, servers, local area networks, cloud services, broadband

connectivity and power. Two critical dependencies are power and broadband availability. **MININFRA** and **MYICT** will be key stakeholders to enable the transformation of classrooms into smart classrooms.



4) **Curriculum and Content:** Development and acquisition of digital content, aligned with the curriculum and that focuses on project and activity-based learning and is fully integrated with the use of ICT, along with the associated formative assessments. This will require the acquisition of a content distribution platform and eventual shift from print to digital content as infrastructure is deployed in schools. REB will brief publishers on the new curriculum to develop e-textbooks in line with the new curriculum and adapt local and international content to complement/ supplement the core e-textbooks. Digital content has advantages of reducing costs of printing, distribution, replacement due to wear and tear and enriching the learning experience.

5) **Teacher preparation and development:** Teachers remain key to the successful integration of ICT in education. As such, the Master Plan envisions a concerted teacher training effort to transform teaching methodology from teacher-centered method to learner-centered method. A policy change will be made to require all teachers to complete a minimum number of training courses per year on the integration of ICT. To ensure adequate teacher preparation and motivation, all teachers will be provided with a laptop issued by MINEDUC (and with connectivity), through a purchase program over 2 to 3 years. Teacher training will be rolled out using a trainer the trainer model.

6) **Higher education, research and innovation:** higher education is critical to spark an innovation economy to transform Rwanda and ICT are seen as a key ingredient and catalyst. Investments in higher education will be prioritized to increase access to higher education, improve quality and drive research and innovation. This will require all students, lecturers and administrators to have their own computing device and investments in high-speed research and education networks, cloud based learning management systems and setting up an innovation center.
7) **Resourcing and Implementation:** To implement this Master Plan will require a budget of approximately $300m over 5 years. These resources are expected to come from government, the private sector, donor agencies, NGOs and the local communities. MINEDUC has already received expressions of interest to support the draft plan from the donor community and the private sector.

What is new in the Master Plan?

The guiding philosophy for ICT integration especially at the primary level for the last 5 years has been the concept of One Laptop per Child (OLPC). While this is the most ideal approach (and remains the end goal) of ensuring education transformation using ICTs, it is too expensive and will take a long time to achieve.

Going forward, MINEDUC will focus on providing each school at primary and secondary level with a number of **Smart Classrooms** that enable shared 1:1 learning environments. This approach is more feasible, less costly and ensures equity of access in the shortest time possible. **Smart Classrooms** are *technology enhanced classrooms* that foster opportunities for teaching and learning by integrating learning technology, such as *computers*, digital content and specialized educational software, assistive technologies, audio-visual equipment and networking equipment. Technology is brought into the classroom rather than students going to a computer lab and every subject taught using technology.

In line with this new direction, MINEDUC will also **redistribute the existing 210,000 OLPC XO laptops** from the current 410 schools to cover over 1,000 schools with Smart Classrooms. MINEDUC together with its partners, parents and the community will continue to drive towards every child having their own computing device.

Coupled with Smart Classrooms, MINEDUC will implement a **One Digital Identity per Student** program that will allow students to use any device and access approved educational resources anywhere anytime through cloud provisioned services.

Taking advantage of the new curriculum scheduled for launch in 2016, there would be a **gradual shift from print books to e-content** as ICT infrastructure in schools is strengthen. Savings made from phasing out print books will be applied to developing additional infrastructure in the schools.

A policy change will be made to require all teachers to complete a minimum number of 40 hours of training courses per year on the integration of ICT. To ensure adequate teacher preparation and motivation, **all teachers will be provided with a laptop** issued by MINEDUC (and with connectivity), through a purchase program over 2 to 3 years. In addition, MINEDUC will appoint **2 fulltime technology integration specialists per sector** to support teachers and schools in integrating education.

At the IPRC and Higher Education level, **every student will be required and facilitated to acquire their own computer** through a **loan guarantee scheme**. All lecturers will be provided with a university-owned laptop and HEC will deliver a **mandatory e-learning course to all lecturers**. All universities and IPRC institutions will be mandated to **switch at least 2 courses to online mode**. National Education and Research Network (NREN) providing high speed connectivity for research and learning will be operationalized and appropriate services will be deployed for research, communication, collaboration and innovation. A national ICT innovation center will be developed.

To coordinate the large investments to be made, ensure efficiency, economy and focus, it is proposed to set up a **dedicated institute for ICT in education** as part of MIEDUC which will be responsible for driving, monitoring, coordinating and managing the Master Plan. This institute will bring together and harmonize the various ICT in Education departments currently scattered across several MINEDUC institutions.

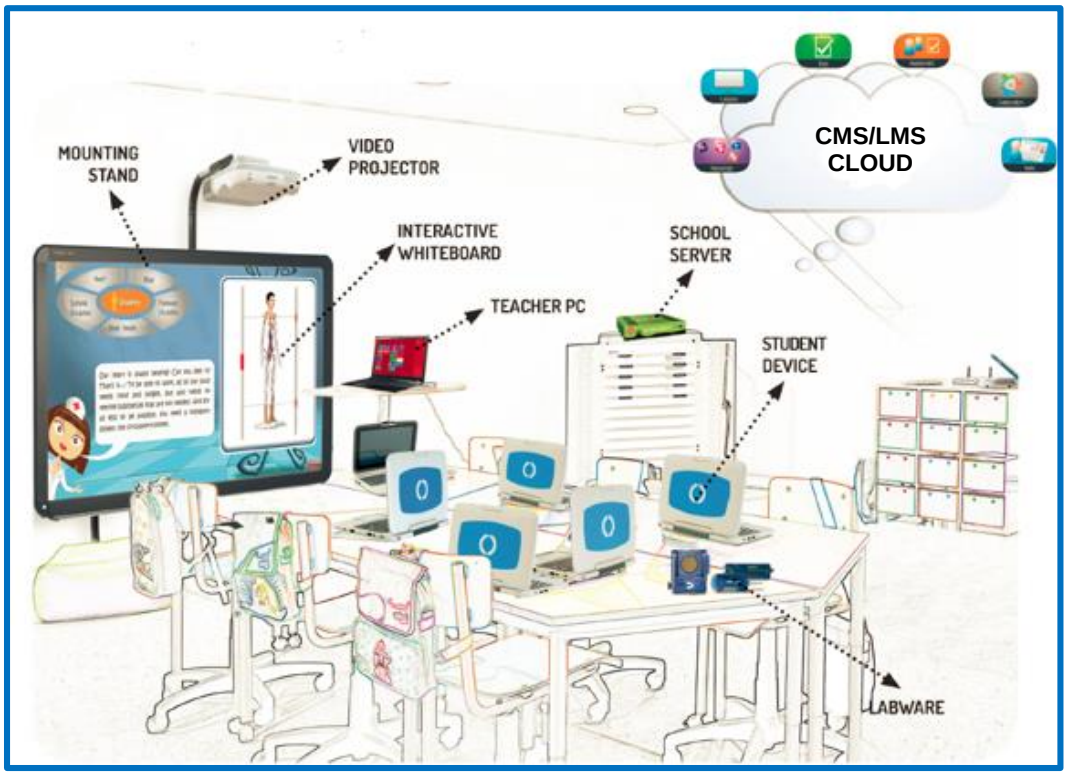
What is a Smart Classroom?

Traditionally, schools were equipped with dedicated rooms for computer labs and in Rwanda an OLPC approach was followed. But this equipment was seldom networked, contained digital content and used in every subject.

In a Smart Classroom, technology is brought inside the every-day classroom with teachers using technology to teach every subject rather students going to a dedicated lab or technology being used on an "adhoc" basis. The advantages of Smart Classrooms include:

- Technology with multi-media digital content brings concept to life engaging students and improving understanding with videos, presentations and other digital content
- Caters for all types of learners with audio-visual digital content
- Teachers don't waste time drawing diagrams on blackboard instead use digital content
- Less use of chalk, less dust promoting healthy classrooms
- Quick digital assessments to determine understanding

The Smart Classroom is physically depicted below with key technology elements. Student equipment will be kept in the Staff Room or Head Master's office and brought to any Classroom in the school.



Strategy for rolling out Smart Classrooms

The strategy here is to start with a shared device model and eventually move to a one laptop per student. Initially, each school will be progressively equipped with a number of "smart Classrooms", covering Primary 1, Primary 4, Secondary 1, Secondary 4 and Secondary 5.

Classrooms will be transformed into Smart Classroom progressively starting with

- Primary 1 and 4 by re-distributing the existing XO (OLPC) laptops
- Secondary 1, 4 and 5 using PBGH laptops

Students' devices will be shared and used to teach specific subjects or curriculum areas. Over the years, the infrastructure in each schools would be increased until a full 1 student 1 device ratio is achieved and every subject is taught with technology.

In 2015, the objective will be to provide all classes above with

- A classroom laptop for the teacher
- A projector
- A whiteboard (including a painted wall next to the blackboard)
- 100 laptops per school

Support for students with disabilities

Appropriate accessible and assistive technology will be deployed to ensure equality and accessibility are addressed for vision impairments, learning impairments, mobility and dexterity impairments, hearing impairments and deafness, and language impairments.

Accessible technology is defined as computer technology that enables individuals to adjust a computer to meet their vision, hearing, dexterity and mobility, learning, and language needs.

Assistive technologies are specialty hardware and software products that accommodate an individual's impairment, disability, or multiple disabilities.

What we need to make Master Plan successful

The successful implementation of the Master Plan depends on a number of key elements. Critical among these are a) enabling policies b) a single implementation framework for the sector c) a concerted communication plan.

Policies

Effective policies are required to drive systematic large scale transformation using ICTs from driving investments in ICTs (devices and

broadband) to ensuring accountability of programs. The summary of new policies required to be enacted are presented in tablet below.

Dedicated ICT in Education implementation framework

To coordinate the large investments to be made, ensure efficiency, economy and focus, it is proposed to set up a dedicated institute for ICT in education as part of MINEDUC which will be responsible for driving, monitoring, coordinating and managing the Master Plan. This institute will bring together and harmonize the various ICT in Education departments currently scattered across several MINEDUC institutions.

Communications and Public Relationship Plan

An awareness campaign will also be launched to sensitize schools, students, parents, the community, public and partners on the Master Plan with regular reviews and reporting of progress. A change management process will be implemented to get the buy-in of key stakeholders, schools, teachers, parents and students.

Proposed new ICT Policies for Education Transformation			
Teacher professional Development	**Curriculum and Content**	**Infrastructure**	**Higher Education**
1) All teachers to complete a minimum of 120 hours of Teacher Professional Development (TPD) every 3 years. 2) Each teacher to have five-year plan to complete 40 hours of approved professional development each year. 3) Require the use of electronic communication (such as email) for all personnel involved in education system and process.	1) Switch from printed learning materials to digital learning materials as infrastructure is deployed in schools. 2) Align curriculum materials with 21st century skills development and new competency based curriculum. 3) Define book acquisition policy to enforce switching to e-books 4) Switch to electronic assessment techniques as infrastructure and connectivity is deployed in schools	1) Provide adequate ICT infrastructure for teachers, schools and students to deliver core curriculum subject matter. 2) All teachers, inspectors should have access to their own computer. 3) Equip schools with adequate ICT infrastructure with minimum 1 computer per 5 students. 4) Promote parents to acquire computing devices for their children. 5) Develop education services to make broadband and power affordable to schools working with MYICT.	1) All universities and IPRC institutions will be mandated to switch at least 2 courses to online mode. 2) All IPRC and Higher Learning Institutions students will be facilitated to acquire a laptop through a loan guarantee scheme. 3) All lecturers will be provided with a university-owned laptop 4) Operationalize National Education and Research Network NREN) providing high speed connectivity for research and learning 5) Cloud services deployed for research, communication, collaboration and innovation