Success & Challenges of the Education System and Development of National Science Strategy in Rwanda

Presentation to 5th Annual Government of Rwanda Development Partners Meeting 1st and 2nd December 2005

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Minister of Education, Science, Technology and Scientific Research
Kigali, RWANDA
December, 2005
Successes and Challenges in Education
The words of Rwanda’s President, His Excellency Paul Kagame

- “Rwanda’s development will ultimately depend on the development of our human resource base and that of the people, with whom we share our destiny.”
- “We will continue to invest in our people and we will strive to open up the frontiers of science, technology and research as we broaden our trade links with our neighbouring countries and beyond.”
Today's Students are the future of Rwanda
Mission and Structure

MINEDUC – Ministry of Education, Science, Technology and Scientific Research

Ministry of Education, Science, Technology and Scientific Research (MINEDUC) is responsible for the development and promotion of Education at all levels from pre-primary to higher education including non formal and vocational training. It is also responsible for Research and the promotion of Science and Technology.
Key Considerations in Development of the Education Sector

Sector Wide Approach programme (SWAP)

- Education Sector Policy (ESP)
- Education Sector Strategic Plan (ESSP)
- Joint Review of the Education Sector (JRES)
- Joint Education Sector Support (JESS)

Encompasses

- Aid Policy Management
- Poverty Reduction Strategies
Key Considerations in Development of the Education Sector

ESSP Priority Areas include:

- Education for All (EFA)
- Capitation Grant Primary Schools
- 9 Year Basic Education
- National Council for Higher Education (Public and Private)
- Science and Technology

Linked to:

- MTEF
- Annual Operational Plan
- Capacity Building
Access to Education in Rwanda

Availability:

- Inputs Required:
  - Classrooms
  - Teachers
  - Books

The following photographs illustrate the construction of new teaching facilities in Kigali Institute of Education (KIE) and primary and secondary school construction.
Construction at Kigali Institute of Education (KIE)

New Science Blocks and Student’s accommodation under construction
Primary School Construction

Juru School in Umutara Province

Musanze School in Ruhengeri Province

Nyagahandagza School in Umutara Province

Bisate School in Ruhengeri Province
Secondary School Construction

Centre Scholaire Gisozi

Kavumu Teacher’s Training College

Kirambo Teacher’s Training College

Nyamasheke Science School
Access to Education in Rwanda (contd)

Affordability:
- No child should be denied the chance to study due to:
  - Inability to meet cost
  - Gender discrimination
  - Any kind of vulnerability

The following tables demonstrate the progress made against the provision of facilities nationally to progress Access (availability, affordability)
### Table 1: Access

#### a) PRIMARY EDUCATION

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Schools</td>
<td>1,845</td>
<td>2,093</td>
<td>2,172</td>
<td>2,262</td>
<td>2,295</td>
</tr>
<tr>
<td>Classrooms</td>
<td></td>
<td>24,844</td>
<td>27,735</td>
<td>29,385</td>
<td>29,748</td>
</tr>
<tr>
<td>Students</td>
<td>1,039,657</td>
<td>1,431,692</td>
<td>1,534,510</td>
<td>1,752,588</td>
<td>1,857,841</td>
</tr>
<tr>
<td>Teachers</td>
<td>18,394</td>
<td>26,187</td>
<td>26,024</td>
<td>28,254</td>
<td>29,033</td>
</tr>
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</table>
### Table 1: Access (contd)

#### b) SECONDARY EDUCATION

<table>
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<tr>
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<tbody>
<tr>
<td>Schools</td>
<td>228</td>
<td>362</td>
<td>363</td>
<td>393</td>
<td>504</td>
</tr>
<tr>
<td>Pu + L.S+Pr.</td>
<td>111</td>
<td>176</td>
<td>176</td>
<td>185</td>
<td>286</td>
</tr>
<tr>
<td>Schools</td>
<td>117</td>
<td>187</td>
<td>187</td>
<td>208</td>
<td>218</td>
</tr>
<tr>
<td>Private</td>
<td>55,641</td>
<td>90,840</td>
<td>125,124</td>
<td>157,210</td>
<td>203,551</td>
</tr>
<tr>
<td>Teachers</td>
<td>1,800</td>
<td>2,399</td>
<td>5,557</td>
<td>6,329</td>
<td>7,750</td>
</tr>
</tbody>
</table>

#### c) HIGHER EDUCATION

<table>
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</thead>
<tbody>
<tr>
<td>Schools (public and private)</td>
<td>1</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td>Students</td>
<td>3,948</td>
<td>5,620</td>
<td>9,820</td>
<td>15,940</td>
<td>25,233</td>
</tr>
<tr>
<td>Lecturers</td>
<td>160</td>
<td>442</td>
<td>810</td>
<td>1,250</td>
<td>1,738</td>
</tr>
</tbody>
</table>
Table 2: Access (contd)
STUDENT ENROLMENT FOR 2004 AND PROJECTION TO 2015

<table>
<thead>
<tr>
<th>LEVEL</th>
<th>Actual</th>
<th>Projection</th>
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<tbody>
<tr>
<td></td>
<td>2004</td>
<td>2005</td>
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<tr>
<td>PRIMARY</td>
<td>1,752,588</td>
<td>1,857,841</td>
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<tr>
<td>SECONDARY</td>
<td>203,551</td>
<td>227,949</td>
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<td>TRONC COMMUN</td>
<td>131,427</td>
<td>151,141</td>
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<tr>
<td>DAY STUDENTS</td>
<td>41,132</td>
<td>59,305</td>
</tr>
<tr>
<td>BOARDERS</td>
<td>90,295</td>
<td>100,408</td>
</tr>
<tr>
<td>HIGHER EDUCATION</td>
<td>25,233</td>
<td>31,289</td>
</tr>
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</table>
Table 2: EQUITY

a) Girls in Primary Education

<table>
<thead>
<tr>
<th>Schools</th>
<th>M</th>
<th>F</th>
<th>% Females</th>
<th>Total</th>
<th>M</th>
<th>F</th>
<th>% Females</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
<td>Public</td>
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b) Girls in Secondary Education

<table>
<thead>
<tr>
<th>Schools</th>
<th>M</th>
<th>F</th>
<th>% Female</th>
<th>Total</th>
<th>M</th>
<th>F</th>
<th>% Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
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<td>Private</td>
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</tbody>
</table>
Visit of Laura Bush to Fawe Girls School in Rwanda
Visit of Laura Bush to Fawe Girls School in Rwanda
Table 2: EQUITY

c) Girls in Higher Education

<table>
<thead>
<tr>
<th>Institutions</th>
<th>2001-2002</th>
<th>2003-2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>Public</td>
<td>7,690</td>
<td>2,536</td>
</tr>
<tr>
<td>Private</td>
<td>2,807</td>
<td>2,907</td>
</tr>
<tr>
<td>Total Pu+Pr</td>
<td>10,497</td>
<td>5,443</td>
</tr>
<tr>
<td>% Pu</td>
<td>73</td>
<td>47</td>
</tr>
<tr>
<td>% Pr</td>
<td>27</td>
<td>53</td>
</tr>
</tbody>
</table>
Quality of Education

In parallel with the issue of Access to Education is the requirement for Quality of Education.

Two main considerations are:

**Acceptability?**
- Is what children are learning relevant?
- Is it providing the best solutions to individual and national problems, now and in the future?

**Adaptability?**
- How flexible our education system is to different and changing demands

**Challenges Include:**
- Teacher Quality
- Teacher Motivation
- Quality of Teaching Methods and Learning Materials
Quality of Education

Strategies to Address the Issues and Challenges include:

- Curriculum Review and Development
- Teacher Training
- Development of Learning Materials
- Teaching Methodologies (especially through the use of ICT)
- Inspections and Evaluation of the Education provided
- Effective Planning and Management of the System
- Teacher Development and Management Policy
- The Establishment of Teacher’s Cooperatives

Other Interventions Under Development Include:

- Vocational Training Policy and Strategy
- Literacy Policy and Strategy
Education Office in Gisenyi Province

Successes and Challenges of Education and Development of National Science Strategy December 2005
Development of National Science Strategy
Some of the challenges facing Rwanda today

- inability to meet food and nutrition needs for the population at large;
- over-exploitation of land;
- the need to widen our economic base
- the need to improve access to basic infrastructure and services such as housing, water, sanitation etc.
- the need to improve access to electricity and hence reduce dependence on biomass
- improve access to clean drinking water
- improve nutrition and hygiene and
- fight the prevalence of Malaria and HIV/AIDS
INTERNATIONAL TARGETS
The Role of Science and Technology in achieving the Millennium Development Goals

The Millennium Commission Project Task Force highlights the importance of the development of science and technology in meeting the Goals:

<table>
<thead>
<tr>
<th>Goal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal 1</td>
<td>Eradicate extreme poverty and hunger</td>
</tr>
<tr>
<td>Goal 2</td>
<td>Achieve universal primary education</td>
</tr>
<tr>
<td>Goal 3</td>
<td>Promote Gender equality and empower women</td>
</tr>
<tr>
<td>Goal 4</td>
<td>Reduce child mortality</td>
</tr>
<tr>
<td>Goal 5</td>
<td>Improve maternal health</td>
</tr>
<tr>
<td>Goal 6</td>
<td>Combat HIV/AIDS, malaria and other diseases</td>
</tr>
<tr>
<td>Goal 7</td>
<td>Ensure environmental sustainability</td>
</tr>
<tr>
<td>Goal 8</td>
<td>Develop a global partnership for development</td>
</tr>
</tbody>
</table>
How a strong foundation of Science and Technology can support the development of Rwanda towards Vision 2020

Vision 2020 Pillars


Ministry & Institution Policies, Plans and S&T Strategies

Main Implementing Institutions

Capability Building

The reconstruction of the nation; An efficient State, capable of uniting and mobilizing its population; Human Resources Development; Town and Country Planning and Development of Basic Infrastructures; Development of Entrepreneurship and the Private Sector; Modernisation of Agriculture and Animal Husbandry.

Human Resources Development; Town and Country Planning and Development of Basic Infrastructures; Development of Entrepreneurship and the Private Sector; Modernisation of Agriculture and Animal Husbandry.


Ministry & Institution Policies, Plans and S&T Strategies

Main Implementing Institutions

Capability Building

Vision 2020

Science and Technology in Support of Vision 2020
National Science, Technology and Innovation Policy – July 2005

Specific Policy Objectives

- **Knowledge Acquisition** – to reinforce Science and Technology teaching and resources at all levels of education

- **Knowledge Creation** – Develop Research Capability in all priority sectors of the economy

- **Knowledge Transfer** – To reinforce Science and Technology Capability in all priority sectors of the economy

- **Innovation Culture** – To encourage Innovation at all levels to help stimulate economic growth
Knowledge Acquisition Overview

OBJECTIVES

Cultivate Interest in Science and Technology

Retain Interest in Science and Technology

Train competent artisans / technicians to give high quality support to the development needs of Rwanda

Train high level technologists to give high quality support to development needs of Rwanda

High level theoretical and practical training for medical practitioners, technicians in various fields, agriculturalists, veterinary practitioners etc.

High level theoretical and practical training for scientists, engineers, doctors etc.

INTERVENTIONS / ENHANCEMENTS NEEDED

Quality of Teaching
Quality of learning environment
Quality of teaching Aids

Laboratories & Lab. Equipment
Quality of Science & Technology Teaching

Quality of Teaching & Curriculum
Inst. Infrastructure
Technical Equipment

Quality of Teaching & Curriculum
Inst. Infrastructure
Technical Eqpt.

Quality of Teaching & Curriculum
Inst. Infrastructure
Technical Eqpt.

Quality of Teaching and Curriculum
Inst. Infrastructure
Technical Eqpt.

Primary Schools

Lower Secondary School
Upper Secondary School

Vocational Training Institutions

Technical Training Schools

Higher Technical & Professional Institutions
KIST, KHI, ISAE, KIE

Higher Technological Institutions
UNR, IRST, ISAR
Technology for Education Access to Rural Areas

- * Infrastructure
- * Medicines
- * Staff

**HEALTH**
- Education on Health Issues
- * Nutrition

**AGRICULTURE**
- Education on Agriculture
- * Threshing Machines
- * Milling Machines

**ENVIRONMENT**
- Education on Environment
- * Improved Cook Stoves
- * Rainwater Harvesting

**RURAL SCHOOL**
- ICT
- Energy
- Media

**LOCAL INDUSTRY**
- Technology Transfer
- * Improved Charcoaling

**WIDER COMMUNITY**
- Technology Transfer
- * Tree Planting Schemes

Successes and Challenges of Education and Development of National Science Strategy December 2005
Progress being made in Education in Rwanda towards Achievement of the Policy Objectives
Rwanda Development Gateway Group (RDGG)

- The Rwanda Development Gateway Group (RDGG) is an initiative of the Government of Rwanda (GOR) and the Development Gateway Foundation (DGF)

- The GOR joined the Gateway Foundation as a founding member since 2002

- The RDGGG initiative is aimed at promoting the use of ICT for development
RITC overall objectives

The Regional ICT Training Centre is based at Kigali Institute of Science Technology and Management - KIST

The aim of the RITC is:

- to replace and substantially improve the ICT training capacity previously provided by semi-qualified colleges in the region
- to build an indigenous and technical human resource base
Human Capacity Development

Distance learning Project

Kigali Inst. Of Education
Centres established in every province
Computers in Primary Schools

Primary School students experiencing computers for the first time, including training of teachers.
Ideas for Primary Science Corner
Ideas for Primary Science Corner

le dioxyde de carbone

l’énergie

Le Cycle du Carbone

La Composition de l’air

La Sublimation

Le Photosynthèse

Utilisations

La Préparation du Dioxyde de Carbone

Mise en évidence du Dioxyde de Carbone

La Nuit

Le Jour

La Photosynthèse

CO₂

O₂

La Nuit

Le Jour

La Photosynthèse

Les formes d’énergie

Énergie potentielle

Énergie cinétique

Les transformations de l’énergie

Énergie électrique

Énergie nucléaire

Des sources d’énergie

L’irradiation

La conduction

La convection

Énergie solaire

Énergie nucléaire

Énergie chimique
Ideas for Primary Science Corner
NEPAD e-Schools Program Overview

The intention of the NEPAD e-Schools Demonstration Project is to provide a continental learning mechanism, based on real world implementation experience, to inform the rollout of the broader NEPAD e-Schools Initiative.

Six schools will be implemented in Rwanda, led by both Cisco Systems and Microsoft Corporation.

This represents a unique public-private partnership, supported by an interdepartmental National Implementation Team in Rwanda.

The primary objectives of the initiative are to provide ICT skills and knowledge to primary and secondary students; make every learner health literate; enable teachers to use ICT to enhance teaching and learning techniques; and to utilize ICT to facilitate efficient management and administration in schools.
Capacity Building for Secondary School Teachers

- RITC trained 400 teachers in 2004
- Partnership established with Microsoft Partners In Learning (PIL) to training up to 3,000 teachers by the end of 2005
- PIL 5 Day course translated into French
- Community Training Centres being established and training of trainers ongoing at present
RITC Secondary School Teachers Training
Schools Infrastructure

- Ministry of Education has signed an agreement for the purchase of 4,000 computers for use in schools throughout Rwanda.
- Other organisations such as World Links, Computer Aid also supporting the provision of computers in schools.
- Local networking being put in place to interconnect computers in the schools to set up computer laboratories.
ETO Gitarama
Rwanda

Reference point for the establishment of future technical schools.
ETO Gitarama Technical Options

Electricity

The learning of power generation & distribution from source to end-user

Electronics

The study of television, telephone & radio
ETO Gitarama
Strengthening links with industry

3D CAD Modeling “SolidWorks”

- Major link with SolidWorks of the US
- Students are using SolidWorks to design components that they then manufacture in the workshops
ETO Gitarama: Biogas Digester

- Rwanda is subject to intense deforestation, accelerated soil erosion and loss of biodiversity
- Prompted the school to change from firewood to biogas
- Biogas produced from human and animal waste through anaerobic bacterial decomposition
- The process takes place in a large underground chamber, constructed by the students
- Taking on the challenge to construct digesters for other schools & promoting the environmental friendly biogas
Students in Library

Micro Biology Laboratory

Animal Health

Students in Library
National University of Rwanda

New Science and Technology Buildings

Electronics Workshop

Science Workshops
Sustained S&T Funding

There is a need to develop ways and means to fund Science and Technology Programmes and Scientific Research.

- A Research Fund will be established, under the NCSTI, and the Government shall allocate 0.5% annually of the national Budget for research and development activities.

- Resources for R&D will also be generated through participation in regional and international scientific and technological programmes (including research).

- S&T Institutions will be encouraged to generate funds by commercialising their services and outputs for the promotion and expansion of scientific and technological activities.
“Physics Teachers from UK Supporting Teaching of Practical Physics to Teachers in Rwanda”

Supported by the Institute of Physics August 2005
NUR and UNESCO-IHE

Master of Science in Water Resource and
Environmental Management

A Cooperation Between Two Water Cultures
Agroforestry Practices in Radical Terracing Run-off Plots for measuring Soil Loss

Farmlands Degradation due to Erosion Contour Cultivation for erosion control

Run-off Plots for measuring Soil Loss Agroforestry Practices in Radical Terracing

NUR and NETHERLAND NUFFIC
Masters course in Agro-Forestry and Soil Science
NUR – SIDA SAREC
Masters course in Information and Communications Technology

ICT Masters students in the ICT Lab at the National University of Rwanda
Future Challenges in Education, Science and Technology

The foregoing has outlined the strategies and successes in Education, Science and Technology.

Much work has been completed and achieved over the past eleven years however......

Still many challenges and hurdles to be overcome including:

- Complete outstanding policies such as Literacy and Vocational Training
- Operationalise Higher Education Council
- Operationalise 9 year Basic Education
- Close Financing Gap in Education Budget (e.g. classroom construction)
- Complete Strategic Plan for Science, Technology and Innovation
- Operationalise Science, Technology and Innovation Policy


Many Supporters to help meet challenges of the future