



Q&A

DR. MUSAFIRI PAPIAS MALIMBA, MINISTER OF EDUCATION

Though small and landlocked, Rwanda is widely seen as a leader in African science. One key to success is strong policy for science and science education, the minister says.

In the aftermath of the devastating genocide against the Tutsi people of Rwanda, the country made a commitment to science and technology as drivers of recovery and development. Today, more than two decades later, that commitment continues – and creates a profound responsibility for Musafiri Papias Malimba, the nation’s minister of education. It is not just schools that he oversees, and not just research, but a holistic system central to present and future prosperity for Rwanda’s people.

A breadth of leadership experience has prepared Musafiri for the challenge. Before President Paul Kagame appointed him minister in 2015, Musafiri was principal of the College of Business and Economics at the University of Rwanda. He served as vice-rector in charge of Academic Affairs & Research at the School of Finance and Banking [SFB] for four years; he served intermittently as SFB’s acting rector. He also served high-level positions in the Rwandan Higher Education Council; the Kigali Institute of Science and Technology; and the Rwandan Ministry of Justice.

Following the TWAS General Meeting in November 2016, Minister Musafiri provided written answers to questions posed by TWAS Public Information Officer Edward Lempinen.

In general terms, how would you characterize Rwanda’s science, technology and innovation (STI) enterprise today versus how it was 10 years ago?

- There is a strong recognition within Rwanda relating to the importance of science and technology to the nation’s development and economic growth. During the last two decades, Rwanda has invested significant efforts in putting in place the governance as well as physical infrastructures to support sustainable development of national STI.

We focus on four cross-cutting themes: knowledge acquisition and deepening; knowledge creation; knowledge transfer; innovation and entrepreneurship culture.

The National Policy on Science Technology and Innovation was approved in 2005 and this Policy is currently under review to ensure the

national STI policy will continue to play a crucial role.

Is it possible to measure the impact of Rwanda’s investment in science and science education on the development



of the nation and the prosperity of the people?

● Science, technology, research and innovation capacity in Rwanda has expanded over the past ten years through government, development partners, and private sector investment. This, in turn, has impacted a significant number of Rwandans – from school children using the Internet to scientists using the newest technologies to solve critical challenges.

A number of studies have been carried out recently into the effectiveness and impact the capacity-building in STI is making on Rwanda's economy, including Mapping Research

and Innovation in the Republic of Rwanda, which was prepared by the Global Observatory of Science, Technology and Innovation Policy Instruments, [GO-SPIN], a new UNESCO initiative. The reports detail several significant recent achievements.

In the past five years, Rwanda has put infrastructure in place to enable it to become an African ICT hub. In 2012, Carnegie Mellon University in Rwanda was established as a regional centre of excellence in ICT. In 2013, Parliament passed a law establishing the University of Rwanda as an autonomous academic research institution with the objectives to produce better-trained graduates

and to strengthen the research capacity of Rwanda's higher education system. Also in 2013, the Ministry of Education established the Knowledge Transfer Partnership programme, in collaboration with the African Development Bank, to foster industrial development.

The Abdus Salam International Centre for Theoretical Physics (ICTP), a UNESCO Category 1 institute in Trieste, Italy, has established a regional branch in Rwanda, the East Africa Institute for Fundamental Research. And the government introduced a National Fund for Environment and Climate Change in Rwanda, which acts as a cross-sector financing mechanism.



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What are Rwanda's primary areas of research focus today?

● The Government of Rwanda is establishing Centres of Excellence focused on building high-level academic and research capacity to address specific development challenges facing Rwanda and the region. These include centres of excellence in fields ranging from biodiversity and natural resources management, to biomedical engineering, energy and data sciences.



We also run the Global Climate Observatory in partnership with MIT.

The focus in the revised Science, Technology, Innovation and Research policy is to encourage and promote the formation of research and innovation clusters in advanced science and technology fields across many fields – biotechnology; biomedical engineering; nanotechnology; quantum sciences; neurosciences; genetic engineering; internet of things; big data; photonics; nuclear sciences and engineering; and precision agriculture.

Can you point to a particularly promising or exciting project right now that may be under the radar?

● One very important developing initiative is the partnership between the Government of Rwanda and the African Institute for Mathematical Sciences [AIMS] – Next Einstein Initiative. The global AIMS headquarters has been established in Rwanda, and Rwanda will host the Next Einstein Forum Global Gathering in March 2018. In addition, there is AIMS Rwanda, a pan-African centre of excellence in mathematical sciences. This was opened in August 2016 with the first intake of 45 master’s degree students selected from 10 countries in Africa, including 16 women students.

The Government of Rwanda believes that the partnership with AIMS-Next Einstein Initiative will accelerate the development of talent in science, technology, engineering and mathematics (STEM) fields that are greatly needed in Rwanda and throughout the region.

The partnership includes the establishment of the Quantum Leap Africa Research Centre. This is positioned to be a world-class centre that will build capability in the information technology of the future. The centre will focus on the emerging



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area of quantum information science and technology.

As early as the 1990s, Rwandan policy recognised the clear connection between primary education and science development. Now, roughly two generations later, are you seeing the impact of improved primary education in students arriving at university?

● Many initiatives are ongoing to increase the quality of STEM education at primary and secondary school levels. There are incentives such as prizes and scholarships for top students

beginning in primary school. To assure the relevance of education, one major reform underway will bring to secondary schools a competence-based system with student-centred learning and a focus on areas such as critical thinking and learning by doing. We are developing a centre of excellence at the University of Rwanda in “Innovative Teaching and Learning Mathematics and Science”. And one of the initiatives in the partnership with AIMS is a gender-responsive mathematics teacher-training program at the primary and secondary levels.

These initiatives, coupled with the move to 12-year basic education,



▲ The University of Rwanda campus.
[Photo: University of Rwanda]

are already increasing the numbers of students able to enter university to pursue science- and technology-related subjects. We expect to see further improvement in the years ahead.

Rwanda's higher education system for science and technology has grown and evolved significantly in recent years. What is the goal of this evolution? Where does Rwanda want its higher education system to be a decade from now?

● The Higher Education sector in Rwanda has grown from around 3,000 students in 1995 to more than 80,000 at present. This in itself has led to many challenges because we need both to build infrastructure and train

faculty to accommodate this growth.

One of the strategies to meet the challenge has been to merge all of the public universities into the University of Rwanda, with a total of six colleges. This creates great efficiencies.

The focus is on ensuring that the students of the University of Rwanda acquire both information and skills that can enable them compete in the job market – not just in Rwanda, but internationally. Our mission is to ensure that the students we produce are as good as, if not better than, students elsewhere in the world.

The ten-year plan is to engage our students in research and to build a research-based institution. We want to support that through wider access to open and distance education and learning, increased use of ICT, and increased research and innovation outputs through collaboration with industry and government.

The East Africa Community (EAC) is known as an innovator in regional development cooperation. Are there any significant current projects in education or STI where the East African countries are cooperating?

● The partner states of the EAC have set themselves an agenda for cooperation in STI. This is recognized in the treaty establishing the EAC which includes a set of common principles and undertakings by partner states in the area of science and technology. The East African Science and Technology Commission has subsequently been established and headquartered in Rwanda.

Among the regional projects is the Regional Centre of Excellence in Health Supply Chain Management, which is supported by the East African Community. The Centre of Excellence for Biomedical Engineering and e-Health is a part of a network of

four, soon to be five, centres related to health supported by the African Development Bank. Each of the EAC countries will host a centre, but each of the centres will support the other countries in the EAC.

Such cooperation gives us an opportunity to maximise the efficient use of human and financial resources. Each country will focus on one particular area of strength, while contributing to, and benefitting from, the other countries in the region.

Considering both the Rwandan STI experience over the past two decades and its orientation to the future, what lessons does Rwanda offer to other African nations? Or to Least Developed Countries beyond Africa?

● As identified through the World Economic Forum, the world is currently experiencing a Fourth Industrial Revolution. This revolution is evolving at an ever-increasing pace disrupting all aspects of Industry and life in every country.

There remain many challenges to ensure that the young students of our region are able to fully participate in this Fourth Industrial Revolution. Science, technology, engineering and mathematics need to be promoted from a very early age, starting in primary education and in support of early detection and incentivising talents in STEM fields.

We believe that the capacity-building initiatives currently underway will go a long way to ensure that Rwanda and the region are able to stay in touch with all these global developments in support of the continent's needs for innovation, creativity and youth employment. ■