



Training the Next Generation of Knowledge Workers in Science, Technology, and Innovation (STI): A Blueprint for Action

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Summary

- STI systems are essential drivers of development
- Many challenges in training the people to implement STI systems
- What needs to be done: university reforms; transfer STI to user; partnerships
- International partnership for STI: Action plan
 - World Bank uniquely positioned to convene
 - Raise STI to priority status within Bank and other development organizations

STI is an *essential driver of development*

...and of wealth creation, value addition, food security, clean energy, health, access to clean drinking water, export diversification, and other needs.

- Because science, technology, and innovation are parts of a single system, each component must function well and relate effectively to the others.
- A well-functioning STI system can adopt, generate, adapt, disseminate, and use knowledge to the benefit of society.
- At the heart of the STI system are the *knowledge workers* who train the next generation of educators, researchers/technicians, and practitioners, including those who fuel the use of STI.

Strengthening STI systems requires:

- Universities that support education, research, and outreach
- Professors who generate and use knowledge, educate the next academic generation, and train workers who will utilize knowledge
- Mechanisms to move STI knowledge out of the “ivory tower” and make it useful

Challenges for the universities (1)

As identified by African VCs in Accra, November 2008:

- Staff vacancies and pending retirements (e.g., 41% vacancy rate at Makerere University, Dec. 2006)
- Explosive increase in university enrollments (e.g., 73% increase in student numbers at UDSM, 2003-2007)
- Low percentage of faculty with PhD (e.g., 12% in Uganda)
- Faculty are not respected by industry, think they have little to contribute to development and have little incentive to try – a vicious circle

Challenges for the universities (2)

- Gender gap: Few institutions outside SA have >25% female staff
- New competition for staff from growing number of private universities, which seldom teach science and engineering
- Little useful laboratory equipment
- Almost no government support for postgraduate students

Challenges for the STI system



- Few people in developing countries have experience with technology transfer, entrepreneurship, or commercialization
- University graduates are seldom equipped with skills employers need
- Faculty have little incentive to work with industry; industry has little respect for academia – another vicious circle
- Few in the private sector appreciate the potential value of STI

What needs to be done: Reform the university system to strengthen STI capacity (1)

Accra forum: many opportunities to strengthen the universities, including:

- Overhaul curriculum to make it more relevant to the needs of society, including more lab and hands-on experience, internships in the private and public sectors, and outreach to the community
- Establish more effective staff recruitment, retention, and development policies
- Make research and the use of research an institutional priority and responsibility

What needs to be done: Reform the university system to strengthen STI capacity (2)

- Design incentives for faculty and students to work with the private sector
- Design more productive governance arrangements and reforms
 - Allow universities more financial autonomy, flexibility to develop new curricula, courses, and areas of study
 - Promote more inter-university partnerships to normalize curricula and policies, share resources and personnel
- Improve research management capacity and recognize instrumentation needs as a budgetary item

What needs to be done: Transfer STI knowledge to those best positioned to use it

University reforms are essential, but not sufficient
(Accra, 2008)

- Knowledge must be not only created and taught to students, but also adapted and used in productive ways
- Build awareness of the value of technical knowledge through workshops, mentoring, public-private forums, “investment authorities”
- Create incentives for faculty to generate more knowledge that addresses local needs, adds value to products, creates new businesses

What needs to be done: Address challenges through collaborations and networks (1)

Most countries in sub-Saharan Africa have small educational and economic communities. Therefore they need economies of scale and collaboration with diverse partners.

- Short term
 - Global Science Corps (GSC)
 - Sends STI experts for research partnerships
 - Addresses urgent need for experienced faculty
 - Diaspora partners
 - Tap eagerness and expertise of global community
 - Learn from IDB and ADB about regional financing mechanisms



What needs to be done: Address challenges through collaborations and networks (2)

- Medium and longer term
 - The GSC is easily expanded to include BS graduates and grad students and to involve teaching
 - Scale up regional networks (such as RISE) to train more PhD-level faculty
 - Through partnerships address the development of human capital for STI as a systems problem

What needs to be done: Address challenges through collaborations and networks (3)

- Medium and longer term (continued)
 - Both new initiatives (EJUST) and ongoing efforts to reform and strengthen existing institutions (PHEA)
 - A new Regional Science Foundation
 - Problem-focused, interdisciplinary, multi-country research and training teams
 - Competitive RFPs requiring mechanisms to make results available to village, farm, and/or marketplace

International partnership for STI:

Action plan (1)

- Building, disseminating, and using STI can succeed *only* through the support of an *international partnership*
- Complementary strengths in the partnership
 - World Bank: Financing, convening power, global reach, contacts at ministerial and presidential levels, S&T policy knowledge (but little scientific expertise)
 - Partnership for Higher Education in Africa: Deep knowledge of higher education
 - Regional research and education networks: Complementary expertise (RISE)
 - Many other experienced partners

International partnership for STI: Action plan (2)

- The World Bank is ideally positioned to convene such a partnership
 - Within the Bank, elevate STI capacity building and application to priority status
 - Integrate the STI strategies of the Education and S&T sectors with PSD, agriculture, health and others
 - Emphasize a problem-solving approach rather than a sectoral approach
 - Couple new STI loans with incentives for university reforms, R&D governance reforms, entrepreneur-friendly economic policies, and support for STI research and graduate education
 - Expand single-country focus to include support for regional programs
 - Design an integrated STI strategy that supports local efforts to promote development goals

Conclusion

The Bank is uniquely positioned to raise STI to the center of a new global development strategy. This strategy is endorsed and in many cases initiated by leaders in the developing countries themselves.

Given the enthusiasm and diversity of the organizations gathered here today, the Bank has an unprecedented opportunity to catalyze a powerful new partnership in support of knowledge-based development.