

The Challenge of Strengthening Mathematics in Africa

Already in this young century, mathematics has continued to strengthen its internal development, extend its interactions with the sciences and engineering, and open new partnerships in fields beyond science. As the uses of mathematics proliferate, so does the imperative for every nation to develop and maintain a “critical mass” of mathematics researchers and educators. Unfortunately, the mathematics communities of many developing countries have been weakened by years of brain drain, civil unrest, and inadequate educational resources.

The Millennium Science Initiative

The Millennium Science Initiative (MSI), established in 1999, seeks to redress such conditions by helping countries strengthen their capacity in science and its uses. The MSI, administered by the Science Institutes Group (SIG, an independent organization with board members from the USA and three developing countries; for more details see <http://www.msi-sig.org>), works closely with the World Bank, the Third World Academy of Sciences, and local scientific communities to design programs of particular value to local needs and opportunities. To date the MSI has launched successful programs in Chile, Brazil, and Mexico, funded primarily by the World Bank, and is designing programs for Vietnam and Africa.

An MSI for Africa in Mathematics

After several years of planning, an African Task Force has recently designed an African Millennium Science Initiative, to be implemented in sub-Saharan Africa. The Task Force was emphatic in its decision to support mathematics as one of its three primary thrusts (the other two are biology and instrumentation/information technology). This decision was stimulated both by the enthusiasm and talent of the mathematical community, despite its small size, and by the decisive importance of the discipline to countries seeking to advance their own development.

Mathematics in Africa

Despite poor classroom conditions, many countries in Africa, both in Anglophone and in Francophone regions, have continued to teach small numbers of mathematics students at a very high level of proficiency through the primary, secondary, and tertiary levels. These pockets of excellence need reinforcing and additional resources if Africa’s well-trained and eager students are to move to the tertiary and postgraduate levels.

Although the interest and talent of numerous students is evident, sub-Saharan nations remain poorly served in mathematics. The following conditions inhibit both research and advanced education at universities:

- lack of a critical mass of mathematicians, inadequacy of facilities for teaching and research, and low numbers of qualified graduate students;
- poor working conditions, low salaries, and weak infrastructure;
- lack of access to current journals, relevant software, and equipment;
- no adequate database on mathematicians and their specialties in Africa.

Few students aspire to careers in mathematics, and the general public has little awareness of the importance of

mathematics as part of a sound education or as an enterprise that supports social and economic activities.

Objectives of the African Mathematics MSI

The African Mathematics Millennium Science Initiative (AMMSI) aims to strengthen mathematics research and applications, mathematics teaching, and raise general awareness of the importance of mathematics for modern science and modern nations. Its principal objectives are:

1. Research: Faculty members in Africa lack funding support and sufficient time away from teaching and administrative duties to perform research. One of the highest priorities of the AMMSI is to provide the opportunity to do so and, where appropriate, to support demonstrations of the application of mathematical work to societal needs and interdisciplinary research.

2. Training and Education: A strong research and training culture requires a critical mass of graduate students and faculty. The AMMSI will support training for M.Sc. and Ph.D. students through scholarships and travel grants, postdoctoral scholarships, visiting scholar programs to augment teaching capacity, and establishment of regional teaching and research centers to increase class sizes.

3. Linkages and Networks: Mathematics is a highly social activity, so the relative isolation of mathematicians in Africa is a grave impediment to mathematical capacity. The AMMSI intends to combat this isolation by supporting professional meetings, national and regional mathematics organizations, and a database on African mathematicians.

4. Outreach and Public Education: The public in most African countries has little understanding of the importance of mathematics to everyday life and to scientific research. The AMMSI will support outreach and educational activities in schools, public venues, the private sector, and the Olympiad framework, with special attention to stimulating interest in mathematics among women.

5. Information and Communications Technology (ICT): Information and communications technology, which has become essential to modern scientists, is still weak in Africa. The AMMSI will attempt to increase the ability of faculty and students to use ICT to communicate with peers, enhance teaching, facilitate research, and gain access to scholarly resources.

Early Millennium Science Initiatives have been designed primarily for individual countries, including the newly-established African Institute for Mathematical Sciences (AIMS). This invites new approaches to fundraising, logistics, and administration. The World Bank, for example, is challenged to move beyond its practice of single-country loans to help finance a regional program that emphasizes African ownership and external scientific review. A successful collaboration will provide a new model for locally planned and internationally supported programs that stimulate research and training in mathematics and its applications.

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