

MICROSCALE SCIENCE: FROM CONFERENCE TO CLASSROOM

This program was designed to enhance science education in low and middle income countries (LMIC) in Africa. Specifically, we are exploring the use of micro-scale science laboratories in Kenyan secondary schools. There is considerable concern about the declining quality of basic sciences in many secondary and tertiary training institutions in Africa. Practical lab work is often extremely limited in LMIC science courses due to the poor availability of equipment, chemicals, laboratory facilities and scientific libraries.

This, along with the recognition of the fact that a sound basic science background is a pre-requisite for applied sciences and technological innovations, led us to explore the use of microscience laboratory exercises in science education.

Workshops on micro-scale science are awash with the excitement of the participating teachers. They demonstrate the enthusiasm and inventiveness of science educators active in many countries. The enthusiasm is underpinned by the conviction that microscience has much to recommend it. For example, only small amounts of supplies (e.g. chemicals, etc.) are required making implementation inexpensive. The apparatus is small and is thus, easily cleaned, maintained and stored for subsequent use. Microscience is environmentally and operationally safer since such small amounts of chemicals are needed. Such an approach is sustainable in that the apparatus is not disposable and can be reused. Workshops on microscience help teachers develop their own microscience techniques using available supplies and thus enhance sustainability. Despite this irresistible set of characteristics, penetration of microscience into the science classrooms has been slow and patchy.

After introducing microscience in over 60 countries under the auspices of UNESCO, we recently evaluated what the challenges are, particularly in Africa. This was done by communicating with teachers and administrators in over 32 countries following microscience workshops. Once we established what the major barriers to implementing microscience were, we realized that the challenges could be met with a top-down approach. Thus, we approached the African Academy of Science, The Kenyan National Academy of Science and the Kenyan Minister of Education. Once we described the benefits of microscience and enthusiastic support was expressed, they were asked to incorporate microscience with its learner-centered teaching techniques, into the teacher training. In addition, these stakeholders were asked to recommend microscience techniques as an option in the practical examination for learners when they complete secondary schooling. Currently these examinations still require only traditional sized equipment.

We are currently implementing this program in Kenyan secondary schools in order to enhance science education in that country. We anticipate that this project will have value to science education by increasing the interest of young people in science so as to promote: scientific literacy, gender equality and encourage students to choose a scientific career. Once the program has proved worthy in Kenya, we hope to adapt the program so as to provide a new level of science education in many countries throughout Africa. In addition, as secondary school budgets shrink in the United States' current economy, microscience may be an inexpensive way to actually expand hands on laboratory experience in a learner-centred approach to science education.