

DOING SCIENCE WITH AFRICA: PARTNERSHIP OPPORTUNITIES WITH RISE.

AMSEN-RISE AT THE UNIVERSITY OF NAIROBI: ACHIEVEMENTS, CHALLENGES AND WAY FORWARD.

INTRODUCTION

The African Materials and Engineering Network (AMSEN) is one of the five networks sponsored by the Regional Initiative in Science and Education (RISE). The specific aim of AMSEN is to prepare PhD/MSc level graduates in the area of materials science and engineering in Africa who would then lead materials research aimed at optimizing the use of Africa's vast mineral resources while teaching at Universities in Africa. AMSEN currently has five nodes in the network: University of the Witwatersrand, SA; University of Nairobi, Kenya; University of Namibia; University of Botswana and the Federal University of Technology, Akure, Nigeria. Given below is a brief overview of the experiences, achievements, challenges and a look at the way forward for the University of Nairobi node of AMSEN.

BACKGROUND

Up to the seventies, the Kenyan Government fully funded university education at all levels in Kenya. As such, universities were able to concentrate on their core mission without worrying much about funding. This model is unsustainable and at some time, the government required universities to raise a substantial part of their running costs. The universities responded to this by levying fees on its students. This meant that the universities concentrated on undergraduate programs where there is a large potential pool of "customers". As such, low volume areas like postgraduate training were given very low priority. Particularly hard hit were programs in science and engineering which require heavy capital investment. In the rare cases when scholarships were offered, the stipends are ridiculously low (about \$ 70 a month). If a candidate persevered and entered the research phase of his/her work, progress was hampered by lack of the most basic supplies and equipment. The result has that it took up to six years to complete a masters degree and over 10 years for a PhD. A good number of candidates simply abandoned their studies midway. The fact that higher qualifications does not translate into higher earning power means that the best students go to industry.

This challenge was partially addressed by sending students overseas (Europe, America, Australia, Asia) for postgraduate study. But this had its own problems:

- A good number of those sent overseas opted not to return, but to work in the countries where they had studied for obvious reasons.
- Those who came back were soon frustrated as they could not have access to the equipment they did their research on and hence could not continue their line of research. Moreover, the heavy teaching load occasioned by the large number of undergraduate students meant they had little time for research anyway.
- Students chosen for overseas study usually had to leave their young families behind as the scholarships did not cover families. This led to severe strains on family life.

ACHIEVEMENTS OF AMSEN

For the University of Nairobi, AMSEN came in at the right time to address some of these challenges. A network of five universities formed in 2008 share both human and physical resources free of charge. Moreover, the funding provided means that the students can:

- a. Get a stipend they can at least live on (approximately \$ 480 for PhD candidates compared to \$ 70 for those on government sponsorship).
- b. Travel within any of the five network universities where a test facility they need is available.
- c. Buy less expensive test equipment, supplies and consumables promptly.
- d. Get varied input to their work due to multi supervision.
- e. Stay with their families and hence maintain family life.
- f. Continue their research even after completing their studies.

The university of Nairobi node of AMSEN was set an initial target of producing 3 PhD/MSc graduates. So far, we have registered 5 students: 3 PhD and two MSc. The two MSc's have completed their work (one has graduated; one has submitted his thesis for examination). Both completed their studies in just a little over two years. A big improvement compared to six years. At least one of the MSc graduates will register for PhD so by the end of 2013, we may have produced 6 higher degrees against the initial target of 3 graduates. Of the 3 PhD candidates, one has given notice of his intention to submit his thesis for examination before end of March this year. If he does so, he will have completed in three years. This would represent a big improvement compared to over ten years. One other candidate should complete by end of this year, while the last has just started his work. This trend is replicated in the other nodes of AMSEN.

Part of the funding provided to AMSEN-RISE is used to purchase test equipment. These pieces of equipment are used not only by AMSEN students but by other University of

Nairobi students as well. These pieces of equipment include a work station (for numerical modeling), a micro/macro hardness testing machine, and a load cell. The latter was used to fabricate a fatigue testing machine. AMSEN funds have also been used to repair/rehabilitate 6 tensile testing machines that are used by undergraduate students of the department.

WAY FORWARD

The challenge ahead is to find mechanisms for sustaining the network beyond the current phase which ends in December, 2013. The current thinking within the network is that each of the nodes should strive to develop into a centre of excellence in one aspect of materials science/engineering, rather than each university trying acquire the whole range of physical and human resources in the entire field. This is informed by the fact that physical equipment for materials research is diverse and expensive. Specialization and sharing would ensure not only availability, but also effective utilization of the resources. The first step is investment in physical facilities. In some of the nodes within AMSEN (notably Botswana and Namibia), the respective governments have already started acquisition of modern specialized test equipment. The University of the Witwatersrand already has a reasonably strong base and specializes in phase diagrams and alloy development. The University of Botswana's electron microscopy unit is fairly well endowed. The University of Nairobi node seeks to develop into the centre of excellence for modeling and characterization of mechanical behavior. Already, the human resource base is in place. What are lacking are modern materials testing facilities. Other avenues being considered are:

- Expansion of the network by bringing in other universities in Africa to join the network. Already, the University of Addis Ababa, Ethiopia and the Copperbelt University in Zambia have expressed interest in joining the network.
- Involving non-African universities in the activities of AMSEN. These universities could participate by allowing access to their facilities for AMSEN alumni, undertaking joint research projects, writing joint funding proposals, or staff exchange.
- Running short courses not only in materials related aspects but also in others areas like writing effective research/funding proposals, etc.
- Involving the African Diaspora, who may contribute by providing material support or spending Sabbaticals in AMSEN universities.
- Offering Sabbatical homes for some AMSEN supervisors.