

## Editorial

## <sup>1</sup>Manpower Development in Biomedical Engineering for Africa: The Engineering World Health Example

Every professional area depend on the education, training and practice of their personnel to develop manpower for their professional needs, all three forming the various spectra or phases of manpower development for any professional carrier. Though, manpower is one of the two aspects of resource needs in profession development; the other aspect being material resources.

Manpower development in biomedical engineering (bme) means the acquisition of specific knowledge (education) as well as strategic skills (training) in a person which enables him to be effective at solving challenging problems (practice or experience) in biology and medicine in addition to health development.

In education, the inter-disciplinary nature of bme becomes indispensable for development of the profession as knowledge flows seamlessly from the mathematical, physical and engineering sciences into the biological and medical sciences, to evolve towards new discoveries and technologies.

Training, usually on-the-job, entails the acquisition of special skills as well as the ability to apply bme knowledge to solve problems in biology, medicine, health care or their applications. This on-the-job flexibility of training makes it the most powerful phase of manpower resource development.

The knowledge and skills acquired by the bme professional from education and training are applied on the job in his work place. Indeed it is only through the phase of *practice* that the levels of knowledge (*education*) and skill (*training*) possessed by a professional can be assessed.

Now, about manpower development in biomedical engineering for Africa, African countries really fall within the group of developing countries or regions. In the context of the bme communities, the factor of 'developing region' would include a region in which there are paucity of biomedical engineers and technicians, or where they exist, do not have sufficient resources to function effectively, whether individually or collectively. As a result, there is poor representation of Africa in the global

community of biomedical engineering.

It is true that in Africa, the manpower development in bme is slow. This is because bme education is yet to be fully appreciated with very few educational and training institutes, yet the development of bme education is the key to real development of the profession.

Many of the developmental efforts in African bme are in the area of training, be it as short courses, continuing education or professional development. This is expected because it is the aspect most prone to sponsorship; it is the aspect that forms an interface for individuals making for changes in their fields of interest; and it is also the aspect subject to intervention by professional institutions and other organizations. So one is a 'biomedical engineering professional' following a series of trainings.

In professional practice, Africa is still in the lowest ebb for bme. There is lack of bme professionals in Africa to man the few healthcare technologies available. In addition, there is the issue of lack of approved standards or regulatory bodies for bme in Africa and most countries do not have a certifying body for bme professionals.

This is not to say that the situation is hopeless for African bme. To be sure, a handful of bme activities are ongoing in Africa. One of the bodies that have enabled biomedical engineering presence felt in Africa is the Nigerian Institute for Biomedical Engineering (NIBE) <[www.nigerianbme.org](http://www.nigerianbme.org)>. NIBE is based in Nigeria and represents the bme profession and its members in Nigeria and in international organisations. It was established in 1999 with the vision "to develop and advance the biomedical science, health and human well-being of Nigeria through modern technological approaches comparable to those obtainable in any developed country of the world".

NIBE has members largely of the various sciences and engineering disciplines from universities and hospitals as well as from other institutions/organisations. NIBE organizes annual bme conferences and professional development courses in Nigeria, publishes a newsletter, a professional journal, Nigerian Journal of Biomedical Engineering and an electronic mail news.

In 2003, NIBE was admitted as the 50th member of the International Federation of Medical and Biological Engineering (IFMBE). The same year, I co-founded the

African Union of Biomedical Engineering and Sciences (AUBES) <[www.africanbmes.org](http://www.africanbmes.org)> in Ghana while on a Medical Equipment Training with other members of NIBE. AUBES was established in order to integrate the effort of various bme professional and to expand cooperation on a continental basis. Since 2003, NIBE has made frantic and mostly unaided efforts to pioneer the development of biomedical engineering in Africa through AUBES.

This is why the role of the Engineering World Health (EWH) based in Durham, North Carolina of the United State of America in the development of manpower in biomedical engineering for Africa is exemplary. EWH is a non-profit organization that mobilizes the biomedical engineering community to improve the quality of health care in hospitals that serve resource-poor communities of the developing world. They install donated and newly-designed medical equipment, carry out repairs and build local capacity to manage and maintain the equipment.

The activities of EWH are composed of the BMET Training Program, the Summer Institute and the Student Programs.

The EWH BMET provides a customized training programme meant for developing world technicians responsible for maintaining and repairing essential hospital equipment. It's a six month's program spanning three years during which participants learn and then reinforce their learning with hands-on-practice at their local hospitals. At the end, participants also receive their certification. In partnership with Duke University and the Developing World Healthcare Technology Laboratory, EWH is able to maintain and extend the BMET to African countries of Rwanda and Ghana as well as other developing countries of Honduras and Cambodia with the GE Foundation funding.

The EWH Summer Institute (SI) is a program which provides an "opportunity for math, science, and engineering undergraduate students to gain hands on repair and design experience while positively impacting the level of patient care provided in the developing country. It's usually a two-month programme during which students live with a host family for one month learning host language and technical aspects of operation and repair of medical equipment. The second is spent in an EWH partner hospital to repair and install badly needed equipment. Since the inception of SI, over 300 participants have worked in over 30 hospitals in Tanzania (in Africa) and then in Nicaragua and Honduras returning 73% of unused hospital equipment, valued at over \$7 million to service in these developing countries.

Although yet to benefit Africa, the Student programs of EWH are made of Chapter activities, Kits program and Design competition. All the Student programs are geared towards raising awareness among undergraduate students of health care challenges that characterize the developing world as well as the medical technology issues unique to resource-poor settings as well as provide ways for them to contribute to solutions to these challenges.

I witnessed the 2011 Summer Institute Conference in Tanzania as one of the two representatives of the International Federation of Medical and Biological Engineering (IFMBE) in August. The programme was used to wrap up the two-month Summer Institute of the EWH embarked by undergraduate students attached to some hospitals in Tanzania. The conference was composed of hospital tours to witness what the SI students had done, addresses by EWH and International Officials, debriefing of students and students presentation of their SI experience.

The 2011 Summer Institute Conference of the EWH in Tanzania and indeed the various programmes of the EWH for Africa and the developing countries were strategic, especially for the activities of the IFMBE Working Group on Developing Countries. This is because the Working Group has a lot to learn from EWH for purposes of developing manpower in biomedical engineering for Africa and indeed for other developing countries.

For one, both EWH and IFMBE have a lot in common working on professional development in biomedical engineering; the EWH, a developed country-based organisation working for developing countries and IFMBE, a global organisation working for the entire globe. The only difference is that whilst EWH emphasizes manpower development by practice, IFMBE emphasizes manpower development by research. Both are relevant to develop manpower in biomedical engineering in Africa and also in other developing countries and so the current partnership should be encouraged.

One way the partnership can be encouraged for the sake of developing manpower in biomedical engineering for Africa is by encouraging the creation of EWH chapters in African institutions where biomedical engineering or related courses are undertaken and directing the students when they graduate to enlist in IFMBE through their country societies or the African Union of Biomedical Engineering and Sciences (AUBES) as the case may be.

Kenneth I. Nkuma-Udah<sup>1</sup>  
Medical Engineer and Doctor  
Managing Editor, Afr J Med Phy, Biomed Eng & Sc