

¹History of Biomedical Engineering in Africa I

Traditionally, the history of biomedical engineering globally has been traced through the continent of Africa, specifically, Egypt some thousands of years ago, albeit, in its rudimentary levels. For instance, a 3,000-year-old mummy was uncovered from Thebes with a wooden prosthetic tied to its foot to serve as a big toe. Researchers said the wear on the bottom surface suggests that it could be the oldest known limb prosthesis. Egyptians were said to have used hollow reeds (both as endoscopy and stethoscopy) to look and listen to the internal goings on of the human anatomy.

What should be rightly called Africa Biomedical Engineering probably started in the 1950s with the first recorded biomedical engineering activity being at the University of Cape Town and Groote Schuur Hospital in South Africa. This climaxed in the work of Allan Cormack in nuclear medicine that eventually led to computer assisted tomography and the Nobel Prize in Physiology or Medicine in 1979. In Nigeria, biomedical engineering activities in the early 1970s with the establishment of the department of Biomedical engineering in College of Medicine of University of Lagos. Then a visible presence of biomedical engineering activities occurred in Egypt in 1976, when Cairo University established a department of Biomedical Engineering. Late starters of biomedical engineering activities include countries like Ghana, which started in the late 1990s thanks to the combined efforts of the pioneering stakeholders in the field..

A full appreciation of the developments in biomedical engineering in Africa can only be done by considering in its totality the developmental pattern of biomedical engineering with respect to its activities through the years. This is important, because the level of development of any profession is to a large extent determined by how highly developed its manpower is as well as how organized its professionals are.

Now, manpower development for biomedical engineering, is the evolution of specific knowledge as well as strategic skills in a person which enables him to solve problems in biology and medicine in addition to health development. And a highly organized profession is evidenced in its professional society's activities. Therefore, we shall look at bme in Africa with respect to the processes of its manpower development, which has mainly three phases: education (for acquisition of specific knowledge), training (for acquisition of strategic skills) and practice (for solving problems); as well as professional organization of bme in Africa.

In Africa, the development of biomedical engineering education can be traced to the late 1960s, when in 1969 the Department of Medical Physics and Bioengineering was

formed in the University of Cape Town (UCT), South Africa. Soon after the establishment, 4 years later, of the Department of Biomedical Engineering as a separate entity, postgraduate programmes in biomedical engineering were introduced in UCT. In Nigeria, the early 1970s, the College of Medicine, University of Lagos established a Department of Biomedical engineering to train low and middle level manpower in biomedical engineering. Then in 1976, the Systems and Biomedical Engineering Department (SBME) was established in the Faculty of Engineering, Cairo University in Egypt and produced first graduate in 1980. In the late 1990s and early 2000s, there was a plethora of academic institutions in Africa mounting programs in biomedical engineering.

Most of the developmental efforts in African biomedical engineering have hitherto been in the area of training, be it as a short courses, continuing education, professional development or even conferences. This is expected because this is the aspect of manpower development prone to sponsorship and form an interface for individuals making for changes in their fields of interest.

This is true because initial entrants into the biomedical engineering profession held degrees and certificates in traditional engineering areas like electrical engineering, mechanical engineering and chemical engineering. So these needed to acquire few biomedical engineering skills to be able to manage biomedical equipment. That is, while education emphasized the development of knowledge, training emphasizes the development of skills, which can come in form of continuing education, continuing professional development or short courses.

Attempts in biomedical engineering training in Africa started even earlier than biomedical engineering education. Many non-biomedical engineering institutions have conducted biomedical engineering courses in biomedical engineering. Specifically, in South Africa, even before the University of Cape Town commenced programmes in biomedical engineering, it has in conjunction with other institutions organized workshops and courses in biomedical engineering in the 1960s. In Nigeria, the early 1970's, the then Nigerian Association of Health Engineering (NAHE) based in the Department of Biomedical Engineering, College of Medicine, University of Lagos had conducted a number of seminars and conferences in biomedical engineering. Their first conference held in 1974.

In professional practice, African biomedical engineering can be said to be currently making steady but slow progress especially with the establishment of a handful of educational institutions and professional societies since the

1960s that biomedical engineering was first observed in the continent.

In Africa, most biomedical engineering professionals work in the hospitals, medical and health centres or other clinical healthcare settings. Therefore, among the five career areas of biomedical engineering – clinical, industry, research/development, academia and government – the clinical setting holds the greatest prospect for biomedical engineering professionals. As a result, many teaching hospitals and ministries of health have recognized and in fact created separate biomedical engineering units or departments from the traditional works department. Biomedical engineering practice in the academia is improving in geometrical proportions in Africa. This is understandable given the high increase in the number of educational institutions mounting programs in biomedical engineering in the continent.

Research centres based purely on biomedical engineering is rare in Africa, other than those in the educational institution running programs in biomedical engineering. However, a handful of ancillary research centres such as those in cancer research, biotechnology, pharmaceuticals/vaccine, agriculture and medical areas abound in many countries in Africa. For instance, Nigeria has the Cancer Research Centre, National Biotechnology Centre, National Vaccin Centre National Virology Institute and Nigerian Institute for Medical Research. Consequently, biomedical engineers are engaged in these research centres to practice biomedical engineering. The industry setting is the worst hit by paucity of the professional practice of biomedical engineering in Africa. There is few or no known sustained biomedical equipment manufacturing in the whole of Africa especially in large scale. However, there have been production of biomedical accessories and disposables and a handful of individuals have tried their hands on biomedical equipment manufacturing and fabrication, though these have not been sustained.

African biomedical engineering industry is largely that of distribution of finished products and services.

There was a mixed grill across the continent in the formation of both national and continental societies in biomedical engineering. For instance, while in South Africa biomedical education and training preceded professional society formation, in Nigeria, it is the professional society that preceded the biomedical education and training. This later scenario is still observed in recent times, for in some countries without an educational institution, they already have a professional society in biomedical engineering.

The earliest recorded national biomedical engineering society in Africa was found in Nigeria in the early 1970s. This was the then Nigerian Association of Health Engineering (NAHE) based in the Department of Biomedical Engineering, College of Medicine, University of Lagos. NAHE conducted a number of seminars and conferences in

biomedical engineering and published a quarterly journal called NAHE (Nigerian Association of Health Engineering). Their first annual conference held in 1974. However, NAHE later got moribund and in the early 1990s came the short-lived National Association of Biomedical Engineers and Technicians (NABET). Finally, in 1999, the up and standing Nigerian Institute for Biomedical Engineering (NIBE) was established to evolve standard and enduring biomedical engineering training and practice in Nigeria. NIBE registered with the IFMBE in 2003 and in 2010, established both a membership association: Association of Biomedical Engineers and Technologists of Nigeria (NABET); and a training college: College of Biomedical Engineering and Technology (CBET).

In 1978, South Africa, the Biomedical Engineering Society of South Africa (BESSA) to take care of biomedical engineering professionals in South Africa. BESSA had joined the IFMBE long before Nigerian NIBE joined. Both BESSA and NIBE are the only biomedical engineering societies from Africa in IFMBE to date.

Concerted effort to evolve a pan African Biomedical Engineering Society started in the year 1994, when the African Federation for Technology in Healthcare (AFTH) was launched by the support of the GTZ. AFTH had a constitution and byelaws and a formal Council. Membership was composed of individual and national societies. AFTH had meetings sponsored by GTZ and had a five-year report (1994-1999) of its activities prepared for GTZ in which it stated some of the programs it had hosted and co-hosted. This spanned 1994 to 1999 and included regional workshops, trainings, symposia, international summit etc. However, nothing was heard about AFTH again till date.

In 2003, the Nigerian NIBE led by Dr Kenneth I. Nkuma-Udah spearheaded the formation of the African Union of Biomedical Engineering and Sciences (AUBES) <<http://www.africanbmes.org>> in Ghana while some of its members were on a Medical Equipment Training with other African biomedical engineering professionals. AUBES was established in order to integrate the effort of various biomedical engineering professionals and to expand cooperation on a continental basis. Since 2003, NIBE has made effort to pioneer the development of biomedical engineering in Africa. AUBES had a Working Committee and its official inauguration and the 1st African Biomedical Conference scheduled to hold in 2005 in Nigeria was cancelled for logistic reasons. However, NIBE has sustained the website <www.africanbmes.org> of the Union with a journal it established in the name of the union. The AFROBIOMEDIC 2016 organised by NIBE is expected to reap the gains of both AUBES and AFTH.

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