

Challenges and Prospects for Quality Assurance in Science and Technology Education in African Universities

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Abstract

The role of ensuring that universities in Africa deliver the quality education and training to meet the continent's needs is, in most cases, given to national bodies or agencies responsible for higher education. However, universities have the primary responsibility for their own academic standards as well as quality processes that underpin them. The effectiveness of quality assurance mechanisms is gradually being undermined by internal and external challenges. This paper gives the global and regional quality assurance context for university science and technology education, schematizes the challenges faced by African universities and national quality assurance bodies and current efforts, discusses prospects and recommends strategies.

Introduction

Quality assurance is a multidimensional concept for which no undisputed definition can be given. But it is widely accepted that quality assurance is the means by which an institution confirms to itself and to others that conditions are in place for it to achieve standards it has set. It is about how an institution of higher learning assures itself that the structures and mechanisms for monitoring its quality control procedures are working and promote delivery of quality higher education (Wabudeya, 2004). It can be discussed at the level of the university and at the level of regulatory agencies (Birungi,2006). For the purpose of this paper, however, quality assurance relates to the achievement of educational programme standards established by universities, professional organizations, and governments or standard-setting bodies established by governments. It is regarded as an important part of academic professionalism; a key mechanism for building institutional reputation, a necessary foundation for consumer protection and fundamental to the security of qualifications and the mobility of professionals.

There are serious challenges in Africa with the rapid expansion of universities, inadequate infrastructure, lack of facilities and up-to-date instructional materials, obsolete and often non-existent equipment, outdated curricula, and limited financial resources and administrative support.

The quality assurance context and trends

African universities are struggling to reposition themselves in an ever changing environment. The work of these universities is set within a broader global and regional quality assurance context and trends.

Dynamic changes globally are altering traditional concepts of higher education. In particular, the growth of new information technologies, the liberalization of trade in education services and the emergence of various forms of borderless education have posed challenges to

Academic standards

Universities endeavour to maintain standards of academic programmes through various mechanisms. They include:

- a. Programme assessment, normally done by a committee of Senate. In addition, it has become common practice in African universities to arrange for professional associations to perform programmes reviews in fields such as medicine, law, dentistry and pharmacy. Professional accreditation bodies examine the general structure and content of curriculum, academic standards and course length, entry level to courses, practical experience, minimum standards of courses to be studied and mode of study. This process enables universities to compare quality of their academic activities with other universities, and to ensure that their graduates are well equipped to operate at the cutting edge of their profession.
- b. Merit based admission criteria.
- c. Quality of academic staff ensured by stipulating minimum qualifications for appointment to various academic posts, and enhanced by staff development programmes.
- d. Different arrangements for the assessment and improvement of staff teaching and research. Universities undertake students' evaluation of teaching, develop special projects for the improvement of teaching and offer internal awards for teaching excellence. Promotion criteria normally focus on the quality of teaching, research activity and community service contributions.
- e. Quality in students assessment, assured through internal and external moderation of examinations questions and an external examination system (for undergraduate and graduate programmes), intended to guarantee impartial assessment of students' accomplishments. In South African universities a third opinion is sought if there is a difference of 10% or more in the marks awarded by the internal and external examiner.

National bodies

Most countries in Africa have an agency/body, which controls quality in higher education. These take the form of national councils for higher education, commissions for higher education or ministries responsible for higher education (Table 1). They regulate, accredit and carry out quality assurance for university level (public and private), and accredit programmes, plan and coordinate and in some cases finance university education.

Policy initiatives regarding quality assurance in universities were already going on before the World Declaration on Higher Education for the 21st Century made its impact. This is especially true of countries such as South Africa where more than a decade of experience now exists. At the same time quality assurance mechanisms are being introduced in various countries as part of their effort to develop university education systems that compete with or, are at least recognized by established higher education systems in the western world. Often, these emerging quality assurance systems are based on a study of best practice in the front-runner countries. It should, however, be emphasized that

although lag-countries do not need to re-invent the wheel, quality assurance mechanisms should be adopted in the context of the education needs of the various countries.

There are a variety of models of quality assurance on the continent. The Kenya model, for instance, entails assisting the universities to meet standards set by the Commission for Higher Education (Irina, 2005). It involves: (a) Establishment of institutional standards with respect to physical facilities, staffing levels and teaching loads, and curriculum standards, including student loads; (b) Peer review, making use of visitation and inspection of the institution, and internal self-assessment by the institutions concerned;(c) Instituting quality control and quality assurance measures, and monitoring how these are being applied; (d) Ensuring adequate financial resources to run the academic programmes; (e) Ensuring viability of financial resources on long-term basis; (6)Instituting a planning culture based on three year financial plans, six year development plans and ten year projections; and (f) Development of a Master Plan.

Table I: A list of selected quality assurance bodies in Africa

COUNTRY	INSTITUTION	TYPE OF BODY	MANDATE OVER
Algeria	Commission Nationale d'Equivalences	Foreign Institution	Foreign Institutions
Angola	Ministry of Education and Culture	Government Institution	National Institutions
Central African Republic	Ministry of National and Higher Education	Government Institution	National Institutions
Democratic Republic of Congo	Ministry of Higher and National Education	Government Institution	National Institutions
Egypt	Ministry of Higher Education	Government Institution	National & Foreign Institutions
Ghana	Committee of Vice Chancellors and Principals of Universities of Ghana	Professional Bodies	National Institutions
Kenya	Commission for Higher Education	Government Institution	National & Foreign Institutions
Nigeria	Committee of Vice Chancellors of Nigerian Federal Universities	Professional Body	National Institutions
Rwanda	Ministry of Education, Science and Technology	Government Institution	National Institutions
Sudan	National Council for Higher Education	Government Institution	National Institutions
Tanzania	Committee of Vice Chancellors and Principals in Tanzania	Professional Bodies	Government & private Institutions
Uganda	National Council for Higher Education	Government Institution	Government & private institutions

Source: AAU (2008)

There are several legal arrangements that govern the establishment of quality assurance agencies and of university education in Africa. They include: Acts of Parliament and legal instruments. In addition, individual agencies have or are in the process of putting in place frameworks to guide quality assurance systems. In Uganda, the Universities and Other Tertiary Institutions Act, 2001, established the National Council for Higher Education (NCHE). The latter has issued more than seven Statutory Instruments on the quality of higher education.

Challenges

The constraints in African universities present a picture of daunting, if not insurmountable challenges. The implementation of quality science or technology programmes at universities has been hampered by rapid expansion of universities, inadequate infrastructure, lack of facilities and up-to-date laboratory and instructional materials, obsolete and often non-existent equipment, outdated curricula, and limited financial resources. Other challenges are institutional inability to recruit and retain quality staff and widespread wars, which lead to the destruction of facilities and infrastructure. Most science and technology students find it difficult to complete their programmes, and receive a lot more theoretical than practical training. Such conditions militate against quality science and technology teaching and learning.

Rapid expansion

The rapid expansion of university education since the 1990s, both in terms of increases of student enrolment and the mushrooming of new (especially private) universities, has stretched physical, academic and financial resources to their limits. It has also posed mounting challenges about how to manage, organize, finance, regulate and integrate university education to ensure sustainable quality and relevance to current and future national human resource requirements. Almost without exception resources fail to match the rate of increase in enrolment, as universities are expected to do more with less in terms of infrastructure, teaching and research facilities. The expansion has resulted in universities operating in overcrowded physical facilities. Academic staff find themselves in situations where they have to use public address systems to lecture. The argument by regulatory agencies (and some academia) has always been that although higher education is a public good, it should not be delivered using public address systems.

Curricula

The bulk of university programmes are outdated and only a small fraction of them are science or science based. The challenge is for universities to undertake curriculum review and development to ensure emerging issues are included and they are compliant with the new approaches in science and technology. In Uganda, the National Council for Higher Education is empowered to determine minimum standards for courses of study and is currently encouraging universities to redesign or review their programmes of study so as to reflect their responsiveness to the needs of society. This should not be viewed as an

infringement on academic freedom but a way by which universities are being encouraged to be accountable to society.

Inadequate physical infrastructure and academic facilities

Most African universities do not have adequate physical facilities such as lecture rooms, office and library and laboratory spaces to provide a suitable learning and teaching environment (Table 2). The existing buildings are often too old, poorly maintained and too small to meet all space requirements. In recent years, efforts have been made to put up new buildings, but given the increasing enrolment pressures; these new spaces are like a drop in the ocean. Some universities such as Makerere have reached or even surpassed their optimal capacity in physical facilities and further increases in student enrolment are likely to yield diminishing returns (NHE, 2004).

According to the African Network of Scientific and Technological Institutions (2005) 55% of laboratory equipment in most departments in universities are not in a state in which they can be used to carry out experiments. The net effect of this scenario is that only about half of the experiments are done. According to available information, 45% of institutions of higher education in Uganda do not have laboratory or workshop space (2006). Library facilities and information systems in almost all universities are antiquated. Books and scholarly journals are not only few but very old, some dating to 1950s, and are therefore irrelevant to current institutional needs and priorities. In many universities, library services are not yet computerized. Most universities do not have adequate budgets to modernize library services. The problem of scarcity of relevant and current journals continues to be the concern of most universities. This also means inability of staff to do research, publish and meaningfully contribute to knowledge.

Lack of equipment, poor staff retention, lack of books and poor physical facilities account for 90% of the main constraints that impact negatively on the implementation of basic and engineering science programmes. The governments in Africa should therefore be encouraged to improve the capacities of their universities as a response to increasing demand for science and technology education.

Table 2: Physical infrastructure and educational facilities in some Ugandan universities-

University	Space(m2) & space/student ratios					
	Lecture		Library		Lab & Workshop	
	Area	Ratio	Area	Ratio	Area	Ratio
Makerere University	11971	0.39	5618	0.18	20750	0.67
Mbarara University of Science and Technology	1891	1.06	540	0.30	1135	0.63
Kyambogo University	6113	0.58	230	0.02	5288	0.50
Gulu University	1753	0.95	793	0.43	998	0.54
Uganda Martyrs University Nkozi	1236	0.48	1033	0.40	1022	0.40
Kyambogo Christian University	1899	0.63	947	0.31	320	0.11
Islamic University in Uganda	2669	1.08	411	0.17	1158	0.47
Nkumba University	4581	1.03	570	0.13	204	0.05

Source: NCHE (2006)

Failure to get aboard the digital revolution

The computer is increasingly becoming the major notebook, textbook, dictionary and storage facility of information for students in quality institutions of higher learning throughout the world (NCHE, 2006). It is evident that universities that fail to utilize the benefits of the digital age-computer assisted learning, web connectivity and networked learning - cannot offer quality education and will perish academically. Further, although most universities encourage departments to improve their teaching approaches through use of technology-mediated methods, they do not necessarily provide the support to achieve this objective.

For a university to fail to jump on the digital revolution is tantamount to committing academic suicide. Unfortunately, some universities in Africa have not entered the digital age..

Table 3: Comparison of institutions of higher learning

University	Area	Ratio	Area	Ratio	Area	Ratio
Makerere University	11971	0.39	5618	0.18	20750	0.67
Mbarara University of Science and Technology	1891	1.06	540	0.30	1135	0.63
Kyambogo University	6113	0.58	230	0.02	5288	0.50
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Staffing and staff development shortfalls

Teaching loads are very high, and time to conduct research or renew course content is low. As a result, course work may tend to be highly theoretical and not up to date or informed by recent research, affecting the degree of market relevance of graduates' skills. Regrettably, private universities depend on already trained local academic staff and part-time lecturers from public universities; thus aggravating the shortage. The challenges are for these universities to pursue vigorous staff development programmes, including being able to recruit and retain staff as the quality of a university very much depends on the quality of the academic staff. The low pay of academic staff forces them to moonlight in several other universities, making them ineffective and inefficient and thereby adversely affecting the quality of teaching. They end up being more on the roads than in lecture rooms.

Financial constraints

Making sure that university education is well funded is part of quality maintenance. Unfortunately, universities in Africa do not have adequate financial resources to improve and expand the physical infrastructure, provide modern academic facilities, attract and retain qualified academic staff needed to deliver quality university education. Further, the existing priorities and strategies in financial planning and budgetary allocations seem to be lopsided in that universities are spending more money on staff costs, administrative overheads and welfare instead of developing and modernizing academic facilities. The way forward is for governments to fund academic programmes instead of institutions.

Quality assurance bodies

There is a rich variety of quality assurance arrangements in Africa (AAU, 2005). They include ministries of education, national commissions for higher education and national councils for higher and advisors of higher education. The main challenges faced by the quality assurance bodies are:

- Effective link between the quality assurance work of quality assurance bodies and the departments of education/higher education
- Establishing a quality assurance system that ensures that higher education and training yield a balance of fundamental work based and reflective competencies required by society and the economy.
- Finding a balance between internal assessment and monitoring of quality (self-regulation) and external regulation by peers/stakeholders.
- Developing the capacity for self-regulation
- Assuring quality across multiple modes of teaching and learning made possible by IT revolution and the expansion of electronic delivery possibilities.
- Establishing a quality assurance system that will be cost effective and efficient and yield continuous improvement in the quality of teaching and learning in universities.
- Reluctance of the universities, especially private ones to submit themselves to the assistance of bodies responsible for quality assurance. In some instances universities have rejected recommendations of quality assurance bodies.

Prospects

From every conceivable angle, the present state of university education is not conducive to the delivery of sustainable quality and relevant science and technology education for the benefit of individuals and the development of our continent for the competitive global village of the twenty-first century. However, these challenges can be transformed into opportunities as the prospects of university quality assurance in the twenty-first century Africa look promising for a number of reasons. (a) The quest for modernization and industrialization of the African economies requires increasing output of highly qualified professional and technical staff from universities, (b) Despite the high cost of university education, compared to the per capita income of most African countries, parents are determined to sacrifice whatever they have to make it possible for their children to get quality university education, (c) There is a high demand for a critical mass of quality scientists and engineers on the continent (d) Plenty of room still exists for African countries to improve quality assurance systems to world standards.

Science and technology issues have acquired increasing attention of the continent, the result of which the African Commission has adopted a Consolidated Plan of Action for Science and Technology. The plan, among other things, focuses on the strengthening of the continent's human skills by increasing the number of scientists, technicians and engineers. In addition, individual African countries have begun to accord priority to science and technology as important factors in efforts to attain MDGs and transform their economies. It is also noteworthy that the G8 group of industrialized countries have put science and technology development agenda for Africa high on their agenda. All these present opportunities for universities to tap resources to improve their quality assurance mechanisms.

Recommended strategies

- An approach of quality assurance that ensures ownership of the quality assurance process in the university establishments.
- A good mix between the quality assurance system, the higher education context in which it has to operate, and the problems surrounding higher education to which quality assurance is seen as a partial answer.
- Setting up quality assurance units in universities to ensure a culture of quality maintenance and improvement is a day-to-day function of these institutions
- Each quality assurance body needs to formulate a quality Assurance Framework focusing on internal institutional and external audit systems.
- Universities should institute funding formulae that enable them to enhance quality assurance i.e. linking planning and budgets to quality assurance.
- Provision of pedagogical training to lecturers as well as to their graduates seeking to become lecturers.
- Universities and key stakeholders should individually and collectively devise means of mobilizing the necessary resources, and devote more of these resources to the rehabilitation and modernization of existing infrastructure and facilities and construct new ones.

- Universities pool together resources through interlibrary book loan services to overhaul and modernize existing library information systems and computerize catalogues and book lending. They also need to pool their resources to engage in bulk purchase of equipments to make them cheaper.
- Universities need to establish mechanisms of acquiring and sustaining subscriptions to journals at least all tonight subject areas.
- There is need to improve access to ICT in universities.

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