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Challenges Facing Adoption of Information Communication Technology in African Universities

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Abstract
A significant number of the universities and higher educational institutions have adopted the latest technology and implemented it productively, for the development of skilled human resource in respective area of specialization, as part of their responsibility. Information and communication Technology (ICT) has grown tremendously around the globe particularly in the developed nations of the world. This growth however appears to be relatively slower in the developing nations including African nations. The Partnership for Higher Education in Africa in a recent workshop survey indicated that while some governments have produced national policies on ICT, many others are yet to do so. As such, the most asked questions is; what are the challenges that hinder African universities to become efficient and effective in use of ICT as compared to developed nations.
Keywords: ICT, universities, adoption, learning

1. Introduction

Today, Universities are expected to contribute to society by widening access to higher education, continuing professional development and applied research, contributing to local economic impact, and improving social inclusion (Beebe, 2012). Universities as institutions for knowledge generation and its transfer to society have been central to development, contributing ideas, skills, technology and expertise in many spheres of human Endeavour (Jega, 2007). They are centre of creative undertakings, innovation and inventions and they impart skills pertinent to these to all those who qualify for enrollment (Jega, 2007).

As at now, universities play a significant role in building up a country's capacity for a mutually beneficial engagement in an increasingly knowledge based global economic environment. Since universities are relevant in national development, information is very important for national development as well. So to help move the nation forward, the use of information and communication technologies should be encouraged and practiced in universities.

According to a recent report by strategic review (2009), it has been emphasized that availability of skilled and employable talent is the responsibility of universities and higher educational institutions. In order to achieve this, concentrated efforts to elevate talent and quality are needed from all the concerned quarters namely the government, the academia and the industry which included use of ICT. At the International level, UNESCO (2007- 08) has prepared a document for Asia– Pacific countries, for the implementation of ICT programs (Roy and Raitt 2003) through the higher educational/ research institutions. In this document, various ICT strategies supporting the core areas viz. learning, teaching (Resta, 2002), training programs and research, driving the higher education towards excellence, have been suggested, therefore African universities. Although ICT has several definitions depending on the nature of its use, for this review ICT (information and communication technology) is used as an umbrella term that includes any communication device or application, encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems, as well as the various services and applications associated with them, such as videoconferencing and distance learning

2. Use of ICT in Universities Globally

A very consistent finding over the past few years has been the high levels of social and recreational use of ICT amongst new and established students, something that found across all European partner universities (SEUSISS Report, 2002). For example, In SEUSSIS survey of established students at Edinburgh University in 2001, found 60% of students reporting daily use of ICT in any form, with under 5% reporting less than weekly use. New students arriving at the university were already used to studying with ICT, for almost 80% said that they used it 2-3 times per week or more, and only 8% that they used it less than weekly. Clearly some of this use was found to be inside school and hence using school equipment and demands, but much is outside school as 74% indicated that they also studied at home with a PC. In contrast, in 1991/92, 60-70% of students reported 'seldom or never' using a PC for their studies, at school or at home. This lack of experience did not result from a lack of interest or willingness, for at that time 70% thought that computers were likely to be 'important or vital to their studies', and 60% were 'looking forward to or were confident' about this

However, the same study found that experiences of advanced or more complex forms of e-learning are quite limited among European university students. For instance in 2001 SEUSISS study at Edinburgh established, although 45% of the students had a course website available to them, only 27% had ever experienced an online discussion, although 42% of student sample had several experiences of course websites

with interactive features, 40% had no experience at all, and 67% reported no experience of on-line discussions (SEUSISS Report, 2002, SPOT-PLUS Report, 2004, Macleod *et al.,* 2002).

Many European university students use ICT daily and seamlessly for both studies and recreation and social interactions like many, if not most, of the academic and administrative staff in the university (Prensky, 2001). Their skills with common applications is self-rated as high, as is their confidence about use of these, and they appear to take up new applications and increase their skills and confidence as the application is 'domesticated', as can be seen with web browsers, email and now web authoring. Females appear to do this a little more slowly than males, and their uptake of new tools may be related to its proven utility in their context.

The options for mobile learning among students in European are increasing rapidly as student ownership of laptops expands as the majority of modern laptops have wireless networking built in or optional with much cheaper PCMCIA or USB cards. The presence of such high levels of PC ownership also makes more problematic the decisions as to the student: PC ratio that is sufficient for effective study. The Dearing Report (Dearing Report, 1997) proposed 5:1, twice the level of the earlier proposals, but when the ratio is approaching 1:1 for own PC and many of these are mobile the provision of wireless and other network access plus study locations with power outlets may become more critical.

Students view use of ICT as a beneficial ingredient in modern university education but mainly as a source of information and research materials on-demand rather than as a direct and structured learning option. This may stem from their quite limited exposure to such e-learning opportunities and wider experience of high quality e-learning activities could alter this view. At least at present, students and their association do not regard e-learning as an appropriate substitute for traditional face-to-face methods but rather as a supplement, a situation that may become problematic if the university wishes to avoid an expensive duplicative approach to teaching and learning. It may be that the social and societal drivers on young people in Europe result in substantial homogeneity of views and experiences. One cannot extrapolate these findings to other groups such as older or less academically qualified students.

In Asia, for example, the University Grants Commission (UGC), New Delhi, took steps to establish an autonomous institution, National Assessment and Accreditation Council (NAAC), to undertake comprehensive assessment of various universities in this region and to rank them. NAAC (2007) developed a framework for higher education based on the promotion and sustenance of quality of teaching- learning, research and training programs. Their most significant core value was quest for excellence/ innovations using the latest technological trends and fostering global competence among students. They devised seven assessment criteria namely, curricular, teaching- learning, research and application, innovation, infrastructure, student support and leadership/ governance aspects to capture the micro- level quality indicators by using differential weightages.

ICT developments in some African countries and some other developing nations have reached the level of having their own home pages, with details on the university's admission, faculties and departments. Some others have in addition to having a website provided detailed information on ICT strategic planning and implementation. Some of the countries covered by the report that have ICT implemented in its higher educational institutions in one form or the other are Tanzania, Uganda, South Africa, Mozambique, Nigeria and Ghana and most current Kenya and Rwanda

In the area of accessibility, ICT via the web has opened opportunities for access to education in Africa for those unable to attend school or college for economic or cultural reasons. Most countries of the world including Kenya and some other Africa countries now have open universities providing education via the internet and other telecommunication devices for people in different environmental settings. There is an indication that the web is a viable means to increase access to education. On the issue of improved learning, Owston (2000) observes that there is debate in the instructional design literature about whether there are any unique attributes of media that can promote improved learning. He proceeded to show that the web appeals to students' learning mode, provides for flexible learning and enables new kinds of learning. The position that ICT can bring about improved learning has also been alluded to by Larose et al. (1999), Luboobi (2007) and Librero (2001). On cost reduction, this may appear possible in the developed world particularly in the USA where web resources are sometimes available for schools at no charge.

In the developing countries, particularly Africa, this may not be the case. Notwithstanding assistance from some donor agencies, the issue of hardware and bandwidth provision still remains hard nuts to crack. ICT can enhance effective teaching, learning and research. It can reduce distances, virtually if not physically, thus providing scholars with easier access to and input into the world of international scholarship – nationally, across the continent and internationally (The Partnership for Higher Education in Africa, 2007b). In the hands of able teachers, the web can play a prominent role in fostering development of such skills as critical thinking, problem solving, written communication, and ability to work collaboratively in students. With the web all imaginable kinds of information can be found and thus teachers can encourage students to explore such opportunities with the view of having sufficient data to weigh evidence, judge the authenticity of data, compare different view points on issues, analyse and synthesis diverse sources of information (Owston, 2000). However, the issue of

integrating ICT into teaching is yet to be given serious considerations by many developing nations of the world, particularly Africa. Until this is done, the unimaginable benefits of ICT will still remain an illusion to many nations.

3. Challenges of ICT in Africa Universities

Realization of ICT in higher education in general and science and engineering in particular is faced with various challenges and the African Universities are not exception

Cognisant of the substantial opportunities that ICT can provide universities, there are a number of problems and challenges that tend to present themselves. Universities are confronted with outside problems coming from their environment, as well as with inside problems coming from their own structure and culture (Loing, 2005). In Africa for instance, there are issues that have to do with national policies and plans. Many of the countries do not have national ICT policies. This leads to situation where each university has to do what it knows best to do without a central coordinating document. The presence of an ICT policy in a country cannot be overemphasized as it goes a long way to streamline ICT implementation across institutions – private or public. The problem of ICT policy brings to the fore the issue of restrictive regulatory framework. Luboobi (2007) observes that the regulatory frameworks for the telecommunications, ICT and intellectual property rights are still restrictive in most African countries.

Another major outside issue that seems to have plagued ICT implementation in universities is the problem of Bandwidth. The high cost of bandwidth, inadequate and unreliable telecommunication services and applications still remains a major challenge. There is also the problem of insincerity on the part of service provider. Many universities are being made to pay for an amount of bandwidth that is never supplied to them. Until they come to the point of having a dedicated pipe for direct supply the issue of surcharging them may never end. It is hoped however, that with the launching of fiber by Kenya the cost of securing bandwidth might be brought down particularly for Kenyan universities. There is also the problem of political instability. Luboobi (2007) observes that Africa is the most unstable continent and its countries are still young democracies. According to him political unrest is a major threat to staff retention and institutional stability. Such instability frustrates policies and plans, and therefore, stagnates developments with all its ramifications.

Within universities themselves, Loing (2005) indicates that the implementation of ICT is not an easy task for faculty and staff members, as decision makers and academics are sometimes reluctant to change curricula and pedagogical approaches. Teaching staff and instructors lack incentives and rewards in a system where professional status and career trajectories are based on research results rather than pedagogic innovation. This obvious lack of incentives perhaps underlies the unwillingness to implement initiatives related to ICT implementation in teaching and learning. Other problems/challenges relate to infrastructure, staff retention, and computer illiteracy among staff and students. Luboobi observed that the African continent lack a continent wide-wide broadband optical fibre network. However, he points out that under NEPAD, there are plans to establish the broadband ICT network for Africa. Though some universities in the region like Makerere University and University of Jos have optical fibre backbone they are not linked to any national bank ICT. There is a major problem of acquisition of ICT facilities such as computers and printers and undertaking viable networking (LAN & WAN) activities within university campuses. Most universities are grossly underfunded and therefore not enabled to sustain the infrastructure required for securing viable ICT facilities in the current ICT-driven world.

Developing and retaining ICT human resource is still a major challenge particularly in African universities. The major reason for this is low salaries and poor conditions of service. This situation has very often resulted in brain drain. Most universities in the developing nations, including Africa nations, are still unable to have its staff and students literate in computer usage. With varying policies over the years, the situation has recorded some improvement. For instance in Nigeria there is on-going programme of the government tagged "Computerize Nigeria Project" (CNP). This programme is aimed at making computers available to Nigerians for use in offices and homes. There is the compulsory computer education course for students in higher institutions. This programme has been on now for close to two decades. On the issue of attitude, specific research dealing with learner or teacher attitudes towards ICT, though few, is a growing field (Brock and Sulsky, 1994; McBride and Nagle, 1996; Aguele, 1997). The stress or anxiety felt by a student faced with the necessity of using computer in a learning or performance context may seems to vary on a number of factors. These factors Larose et al. (1999) observes include the students' degree of computer literacy, whether or not the student has had previous access to a personal computer and for what length of time.

However, no study appears to be available on the subject of illiteracy stress and anxiety as it relates to computer integration into teaching in universities in Nigeria. There also seems to be no documentation relating to the use of ICT in teaching in universities in the country. If they do exist, they are skeletal and without proper documentation in spite of the array of benefits derivable from the use of ICT in teaching and learning. This study therefore attempts to investigate the attitude of teaching staff to computer, use of ICT tools in teaching and learning and the challenges of integrating ICT into teaching and learning in Nigeria universities.

The worldwide spread and evolution of information and communication technology (ICT) during last 40 years has been rapid and challenging to top corporate and ICT management (Applegate, 1994). During this period, new industries have emerged, new structures have been created, new problems have cropped up, new responsibilities have been defined and relocated, and new management strategies have been introduced. New systems have been, and are being developed, which profoundly affect the ways in which organizations operate leading to the need for innovative organizational and ICT management. The effects of the new technology are profound and have been felt far and wide, including public universities in Kenya.

The rapid infusion and diffusion of information and communication technology into public universities in Kenya raise important management issues for top management and the technical staff. Although ICT is employed in organizations to gain an advantage over old ways of doing things (Lucas, 1997), and modern approaches to management of information systems, which recognize distinct arenas of functional areas, application areas and technical areas are used (Looijen, 1998) the establishment of many computer centres in public universities without clear aims, objectives and control, has led to an alienation of these units from their organizations causing them to operate largely independently of the organizations they are intended to serve. This is due, in part, to misalignment of objectives (Wexelblat, 1999). Based on information gathered by the author from numerous internal reports, minutes of meetings and committee reports, at Moi University (MU); and from national newspaper reports (Kenya's Daily Nation, [DN], East African Standard, [EAS]), complaints from government officials, academics, practitioners, politicians and opinion leaders on declining academic standards, and through observation as a concerned participant in one of the public universities, a lot needs to be done as far as management of ICT in particular, and other resources in general, are concerned.

According to the writer's conservative estimates, each public university now has over 1000 PCs of various makes, types and capacities scattered over several campuses, in administrative offices, computer laboratories, in various faculties and/or departments. Many ICT resources are out of order for lack of management, control and maintenance and vital replacement parts. In a small number of cases, PCs are connected to form local area networks (LANs). The rest are a virtual collection of autonomous islands of technology isolated from other units although they structurally belong to, and should be used to support, the same organizations.

Aiyepeku *et al.,* (1994] state that the strong interest in the adoption of ICT to provide information services emerged in Sub-Saharan Africa (SSA), including Kenya, for three reasons: one, the revolution in ICT has resulted in computer hardware becoming cheaper and, therefore, more widely available. At the core of this development is the ever powerful and ubiquitous microprocessor. Two, the substantial, value added, utility of ICT in the provision of, and access to, information services for improved planning and organizational management has become more widely recognized. Three, the international development agencies and donor countries have exerted significant pressure upon many governments, institutions of higher learning and other recipients of their aid, covertly and overtly, in developing countries to adapt the extensive use of ICT to improve their workforce performance and organizational management. The limited knowledge of ICT found at the level of top management compounds the situation even more, especially on technical issues and investments in ICT. Many senior and influential university officials with positions of responsibility requiring decision-making received their education and early work experiences well before the advent of, and wide-scale introduction of the computer technology. They also did so in environments where the capabilities of what IT was available, were very limited indeed compared with those of today. It is, therefore, not surprising that these officials lack sufficient grasp of the issues related to ICT resources and its management, and struggle to provide adequate and effective managerial direction and support that is so much needed.

The lack of trained and experienced technical personnel to manage, control and maintain the increasingly large numbers of these resources means that their utility values, effectiveness and efficiency, cannot be ascertained. The lack of theoretical knowledge and practical management, control and maintenance skills of ICT staff leads to these units being managed, controlled and maintained virtually on trial and error basis. Looijen, (1998) points out that in the field of education, i.e. universities and high schools, a lack of standards, and pseudo 'standards' that differ enormously, introduce real challenges to achieve a decrease in the capacity and effort required to use the facilities optimally. In addition, the rapid increase in quantities of ICT resources and establishment of ICT units in many organizations across the country has created a rapid turnover of the few available trained technical personnel and leading the less financially well endowed organizations to fail to attract and retain competent computer staff. Consequently, this creates huge management problems for the public universities since they depend on the government for staff salaries, which are low.

It must be noted that the manner in which information and communication technology was introduced in Kenyan public universities was initially piecemeal, uncoordinated, and in most cases haphazard. Top university management officials often had little control over the acquisitions of ICT as agreements were largely made bilaterally between external donors and the respective departments and faculties concerned. To-date, there exist very few budgets for the development and management of information and communication

technology in faculties and departments. This points to a lack of recognition by the university management of the importance of ICT to their organizations. Often, there are no policy frameworks, at either organizational or national level, to guide the adoption of this technology to realize its full potential benefits (DN, 2001). Within a short period of time, public universities in Kenya have had to cope with a diversity of new ICT related problems over and above their old 'normal' problems on the economic, social, governmental and political fronts. The new problems, which are closely linked with the introduction of the computer technology, include low computer literacy among staff, securing and installing the information and communication technology (ICT) resources, hiring and training technical personnel, and managing, controlling, and maintaining ICT within a rapidly changing environment. The effects of globalization mean that organizations in Kenya have to deal with more problems than their western counterparts in their effort to catch up with the developed world. The result is that the external supporters (donors) and other stakeholders fail to understand why their financial, material and other forms of aid have not brought about the desired results of enhanced performance.

Little is known about the planning, development, implementation, utilization, exploitation, management, control and maintenance of information systems in many public universities in Kenya. The external donors and other stakeholders have little knowledge of the decision-making processes, university activities, including teaching, research, and administration, which the donated ICT is, in theory, intended to support, nor of the situational or contingency factors that act on the processes and activities in the universities within the milieu that they operate. An examination of Kenyan university documents on ICT reveals in many cases that hardly any policy framework exists to guide the development, adoption and management of information and communication technology. Various parts of a university develop their own information systems independent of others with no common standards. In many cases the technical staff that manage the information systems lack the necessary skills and knowledge and experience required to manage, control and maintain ICT, to support their organizations, effectively and efficiently. One observation in these universities, as in many other organizations, is that, due to their lucrative nature, the top positions in IT projects are currently held by personnel who are themselves non-IT experts, and this poses a major problem in the development, utilization and exploitation of ICT. A lot of these officials have very little knowledge of ICT itself and in most cases have no experience at all of managing ICT projects.

Most of the ICT technical staff train initially, not in computers, but in other technical fields such as electronics, librarianship, or mechanics and only later on switch over to managing computers, creating a continuity and credibility gap between professions. To add to this, users have yet to fully adapt and to internalize the new technology and make it one of their own day-to-day instruments of work. The lack of computer culture in public universities impedes rapid diffusion of the new technology. Very often the aims of the ICT management units and those of the universities as organizations are not aligned, creating autonomous units that consume huge financial resources but which do not result in many benefits for their organizations; however, this argument does not imply that there is lack of appetite for computer technology in Kenya. On the contrary, one may indeed hypothesize that all human societies abhor a technological vacuum, and based on this proposition, the Kenyan society, once it has acquired it, may not be prepared to give it up unless there is a better technology to replace it.

4. Recommendations

Based on the findings of the study, the following recommendations were made: ICT projects and are financially demanding. The universities therefore require increased and adequate funding from Government and their proprietors to enable them provide the needed facilities, logistics and technical support required by ICT projects. Such increased funding will also make available to university management the finances to train, develop and retain ICT experts in their institutions. Deliberate and sustained approaches should be taken to address ICT staffing. This includes strategies for retention of ICT staff, and for knowing that those who leave must be replaced. Such strategies may include offering ICT training opportunities and pay package. There should be adequate preparation of staff and students to improve their literacy level in ICT. This will help to create in them the willingness to embrace the challenges of integrating ICT into teaching and learning processes. As a step towards actualizing this, the ICT units in universities should organise orientation programmes/workshops for staff to enhance their literacy level and the mandatory computer programme for students should be reappraised to make it more practically oriented. The naughty problem of bandwidth need to be vigorously tackled. The universities need to undertake appropriate research to determine how much bandwidth they actually have need for to avoid wastage. Excess bandwidth capacity exists in satellites and fibre optic cables. Though expensive to deploy, universities should consider the use of such facilities in their installations. Besides, universities should explore the potential of creating consortia to purchase bandwidth at wholesale prices. This calls for collaboration between universities.

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