ENHANCING THE CAPACITY OF EAST AFRICAN UNIVERSITIES TO UTILIZE ICT FOR SUSTAINABLE REGIONAL DEVELOPMENT

A Proposal Presented to

ASSOCIATION OF AFRICAN UNIVERSITIES

Within the DfID CHALLENGE FUND

MOBILIZING REGIONAL CAPACITY INITIATIVES (MRCI)

by

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Executive Secretary
Executive Summary

The transformation of higher education must be coupled with the effective application of ICTs in teaching, learning, research and innovation, as well as the administration of the academic institutions. The Inter-University Council for East Africa (IUCEA) is keen to promote and assist member universities in taking advantage of the emerging ICTs in the delivery of higher education. Consequently, application of ICT and networking is one of the strategic objectives that the IUCEA is presently pursuing in order to provide an effective strategic support to member universities in their teaching, research and public service roles.

Already, the IUCEA has initiated a number of projects and activities aimed at enhancing the capacity of universities in the region in order to support their core functions. These include an ICT survey conducted in 2002, an ongoing collaborative ICT research project called VarsityNet, holding a regional symposium on ICT and library education in East Africa, and partnering with a number of European countries in a project to establish a European-African multimedia information resource network with a hub at the IUCEA. However, more still needs to be done in order to ensure that universities exploit the full potential provided by ICTs.

The IUCEA recently concluded the development its 5-year strategic plan, in which several challenges facing higher education in their need to embrace ICT for sustainable development have been identified. Physical infrastructure, especially the issue of bandwidth, continues to pose serious challenges inhibiting access to information resources over electronic networks such as the Internet. Universities will also need to improve ICT skills of their staff through continuous training programmes. At the same time, the current status in the region requires innovative ways to support teaching and learning. Due to the increasing cost of information sources, library groupings in the form of consortia must be encouraged to improve access to available information.

In order to address the above challenges, the IUCEA is now proposing a project to enhance the capacity of East African universities in utilizing ICT as a tool for teaching, research, administration and community service. Within this project, the IUCEA proposes the development of appropriate physical and information infrastructures, innovative pedagogical approaches, and human resource capacity improvement. The following specific objectives will guide the project:

i) To develop a framework for a shared e-learning system for universities in East Africa;

ii) To establish and manage online information resources for supporting East African universities in teaching, research and public service;

iii) To develop staff-training programmes in ICT that address strategic needs of universities in East Africa;

iv) To institute a common regional approach to reduce bandwidth costs.

The first objective within this project will be pursued through two main activities: first, to assess the existing distance education and e-learning systems amongst member universities, and second, to develop a framework for a shared e-learning system. Within the second strategic objective, the IUCEA proposes to start by identifying the electronic resources (including national and international databases and repositories) that may support universities in their teaching, research and public
service needs. This will then lead to the development of a database-driven web portal that links stakeholders to relevant information sources and resources (e.g. libraries and other electronic databases).

In order to develop training programmes for staff (objective three), a training needs assessment exercise will be undertaken in order to identify the skills that staff require. This will then lead to the development of ICT training programmes for academic staff based on the identified needs, which will then be validated through a pilot group of trainees. Finally, the IUCEA will undertake a study aimed at coming up with practical strategies of reducing bandwidth costs for member universities (objective four).
1.0 Introduction

Globally, there has been a proliferation of activity focused on using ICTs to enhance the efficiency and effectiveness of education systems. Interest in educational applications of ICTs has been stimulated both by the potential offered by these technologies and by the range of complex problems facing education systems worldwide (James, 2001). One of the key issues driving the transformation of the education sector is the significant increase in the demand for higher education in both developed and developing countries. LaRocque and Latham (2003) estimate that the overall demand for higher education is expected to grow from 48 million enrolments in 1990 to 159 million in 2025 – an annual growth rate of 3.5 percent. From an economic perspective, the International Data Corporation (IDC, 2004) has estimated that world revenues in the corporate e-learning market will surpass $21.1 billion by 2008, compared with a $7.9 billion market in 2004 (van Dam, 2005). According to this estimate, the market for online courses offered at universities will continue to grow by about 25% to 30% a year. Consequently, African universities need to take advantage of the benefits of ICT to transform their teaching and research programmes to respond effectively to the challenges of globalization (Benneh, 2003).

The integration of ICT into teaching, learning, research, information dissemination and management activities in tertiary education has been a priority issue in African higher education institutions (HEIs) for a number of years. In East Africa, ICT has begun to have a significant presence in education, although the impact has not been as extensive as in other fields. Each of the five East African Partner States (Kenya, Uganda, Tanzania, Rwanda and Burundi), and even individual universities within the region, are presently exploring ways in which the use of information technology can be mainstreamed across the higher education sector. In his keynote address during a meeting of the IUCEA Specialised Committee on ICT Education (November, 2006), Prof Nick Wanjohi, Vice-Chancellor, Jomo Kenyatta University of Agriculture and Technology, observed that the transformation of higher education must be coupled with the effective application of ICTs in teaching, learning, research and innovation, as well as the administration of the academic institutions.

The IUCEA is keen to promote and assist member universities in taking advantage of the emerging ICTs in the delivery of higher education. In doing this, the IUCEA will need to intervene strategically if it is to successfully integrate ICTs for the sustainable development of its member institutions. Consequently, application of ICT and networking is one of the strategic objectives that the IUCEA is presently pursuing in order to provide an effective strategic support to member universities in their teaching, research and public service roles. External assistance will, however, be required to enable universities in the region to take full advantage of ICT in their goals of contributing to the sustainable development within their respective societies.
2.0 Background of the Inter-University Council for East Africa (IUCEA)

In recognition of the role of higher education in the region, the original three East African Partner States (Kenya, Tanzania and Uganda) established a regional body – the Inter-University Council for East Africa (IUCEA) – whose main objective has been to facilitate contact between the universities of East Africa, provide a forum for discussion on a wide range of academic and other matters relating to higher education, and help maintain high and comparable academic standards. The IUCEA is charged with the mission of coordinating and facilitating stakeholders so as to promote strategic, sustainable and competitive development of the higher education sector in East Africa.

In order to strategically position itself for the challenges envisaged, the IUCEA has recently developed two key strategic documents: a 10-year Perspective Plan and a 5-year Rolling Strategic Plan. The purpose of these documents is to transform the Council into an effective regional advocate and catalyst for the strategic development and management of higher education in East Africa. After further revisions and endorsement by the Governing Board, the IUCEA Strategic Plan is now in a form ready for developing specific projects.

One of the key tasks of the IUCEA has been to explore ways of harnessing the potential of ICT to improve higher education in East Africa. As identified in the plans, application of ICT and networking is one of the strategic objectives that would enable the IUCEA to provide an effective strategic support to member universities in their teaching, research and public service roles. The IUCEA is thus challenged to promote and assist member universities in taking advantage of the emerging ICTs in the delivery of higher education.

As figure 1 shows, two of the three core functions identified within the strategic plans underscore the role of ICT:

i) *Coordination of inter-university cooperation*. To strengthen regional communications through electronic networks which link member universities together and provide a link to relevant sites in East Africa and the world.

ii) *Facilitation of the strategic development of member universities*. To collect, classify and disseminate information on higher education and research, particularly in East Africa.
2.1 Related ICT Initiatives

The IUCEA has been keen to make a strategic contribution towards cost-effective electronic linking of member universities through ICT and making available shared e-resources and promoting more inter-university collaboration in ICT. Consequently, the IUCEA has initiated a number of projects and activities aimed at enhancing the capacity of universities in the region in order to support their core functions. Some of these are outlined in the paragraphs below.
2.1.1 ICT Survey

Through support from the **Ford Foundation**, the IUCEA undertook a preliminary pilot survey in 2002 with two main objectives: first to establish the information requirements of universities, and the major sources of information used to satisfy this need; and second, to assess the current ICT infrastructure and what might be required in order to facilitate each institution’s participation in the current inter-university information and ICT initiatives. This study formed one of the initial initiatives by the IUCEA aimed at creating a better understanding of the needs of its member institutions in order to formulate relevant strategies for fostering closer ties amongst universities in East Africa.

However, following the adoption of the new **Strategic Plans**, there is now an urgent need to update the needs by assessing the current status in terms of ICT infrastructure and capacity, and their needs relating to the application of ICT in teaching/learning, research and community service. This capacity analysis is expected to reveal the different levels in which the member universities are in respect to the development of their respective ICT capacities. This is eventually expected to enable the development of more relevant intervention mechanisms to address the exact need of the different institutions. The IUCEA is already exploring this.

2.1.2 VarsityNet

Since 2003, the IUCEA has been receiving support from the **UN Economic Commission for Africa (ECA)** for the coordination of an ICT research project amongst universities in East Africa. This project, called VarsityNet, aims at enhancing the role of universities as centres of excellence in research, specifically with respect to strengthening R&D in ICTs resulting in the development of innovative ICT solutions to national and regional challenges. Two phases of the project have now been supported.

During the first phase, the team (from Computer Science departments of Makerere University in Uganda, University of Dar es Salaam in Tanzania, and the University of Nairobi in Kenya) chose to develop a prototype application to demonstrate how an activity of the IUCEA could be better managed. Accordingly, a pilot application based on open source software (OSS) that supports the International Fellowships Programme (IFP) for East Africa, was successfully developed and implemented. The second phase scaled up the project into a wider context, bringing in more universities (15 both public and private). During this phase, the IUCEA VarsityNet team successfully developed an **Inter-University Information System based on Open Source Software** to manage students’ academic records within the universities in East Africa. This system has now been tested at selected member universities, and has fully been implemented at the Faculty of Computing and Information Technology, Makerere University. The project is now exploring the feasibility
of formulating a sub-regional policy to guide the integration of ICT into higher education in East Africa.

2.1.3 Regional Symposium on ICT and Library Education in East Africa

As a way of initiating the process of dialogue with member institutions, the IUCEA organized a meeting bringing together top ICT and library personnel in all member universities in East Africa. The meeting focused on the collaborative strategies among the IUCEA member institutions, especially in the areas of university library and information services development, digitization and access to global e-resources, and joint publication efforts. Other themes addressed included the creation and establishment of e-networks and e-learning infrastructure, support of on-going ICT initiatives, and harmonization of ICT policies.

These issues were addressed through three thematic areas.

i) Regional e-networks and e-learning

ii) ICT policy and bandwidth issues

iii) Digitisation and publishing

A report of the meeting outlines the key areas that member universities require the IUCEA to intervene on their behalf with respect to the area of information and ICT development. A number of these issues are currently being explored.

2.1.4 CREATING (http://www.creating7.net)

The IUCEA is an active partner in the project “Cooperative Research on East African Territorial Integration within Globalization (CREATING).” This project, funded by the European Commission within the Seventh Framework Programme, brings the IUCEA into collaboration with seven European partners to establish research networks linking together scholars across eastern Africa with colleagues in Europe.

Of particular interest to the IUCEA within this project is the need to establish a European-African multimedia information resource network, with two main hubs, one in Belgium (at the Royal Museum of Central Africa) and the other in East Africa (at the IUCEA). The information resource network is being developed on an infrastructure that is capable of providing services and communication among researchers and stakeholders and multimedia documentation. Later, the network is expected to facilitate the e-learning development process especially for graduate students and the joint research initiatives among scholars especially through the open source software mechanism. Within this project, a call for proposals has already been announced for training and research opportunities in eastern Africa for registered masters and PhD research students.
3.0 Project Team

Whereas all the IUCEA staff will participate indirectly in this project, a number of staff will undertake crucial roles directly linked to the success of the project activities. These are described briefly in figure 2 below. The curriculum vitae of key staff are attached as appendix 1.

**Figure 2:** Organizational Chart for the Project

**PROJECT DIRECTOR**

Prof Chacha Nyaigoti-Chacha – Executive Secretary

Will be in charge of the overall management of the project from a policy perspective. He holds an MPhil and PhD in Anthropological Linguistics from the Yale University as well as Bachelors and MA from the University of Nairobi (Kenya). Has held various teaching positions in a number of universities including Egerton (Kenya), Kenyatta (Kenya) and the University of Nairobi, University of Dar es Salaam (Tanzania), Makerere (Uganda) as well as Yale, Murray State and Penn State in the USA. Has also held administrative positions as CEO of Higher Education Loans Board in Kenya, principal of several university colleges, dean of faculty as well as head of department. He has been awarded various research grants from various institutions. He is widely published, and is a member of academic associations in the USA, Italy and East Africa.

**PROJECT ASSISTANT - TECHNICAL**

Mr Philip Ouma Ayoo – Electronic Database Specialist

Will provide the technical guidance for the project, and participate actively in the execution of project activities. As head of the ICT unit, he oversees the development of appropriate ICT capacity at the IUCEA and member universities. Coordinates the East African VarsityNet project, a UNECA-supported ICT initiative, which brings together universities in the region to undertake research on applications development using open source software. He holds a Master of Philosophy degree in Information Science and a Bachelor of Science in Information Technology. Currently a PhD student in Information Systems at Makerere University, Uganda. His research interests are in the areas of online learning and ICT policy development, where he has published and presented a number of papers. Before joining the IUCEA he was teaching at the Department of Information and Media Technology, Moi University, where he had previously served as a Senior Technician. A senior member of the Uganda Computer Society.

**PROJECT ASSISTANT – ADMINISTRATIVE**

Dr Benedict Mtasiwa – Projects and Programmes Officer

Will provide administrative and M&E guidance for the project. He is responsible for projects and programmes, covering research, academic and administrative aspects. Has a PhD degree (Concrete Technology) from the Graduate School of Engineering, Hiroshima University, Japan. Has a masters' degree from the same institution, and a Bachelors degree in Engineering from Eduardo Mondlane University, Mozambique. Previously worked as Research and Development Director with the African Institute for Capacity Development (AICAD). Was also a lecturer of civil engineering with the Dar es Salaam Institute of Technology where he was also a co-coordinator for the research and consultancy bureau. Has also worked as Materials’ Quality Control Engineer for a construction company, and inspector and designer of various construction works. He has published five refereed papers, and presented papers in 12 conferences. Current interests include monitoring and evaluation techniques for projects and programmes, implementation of strategic plans as well as quality assurance. A member of the Japan Concrete Institute.

**PROJECT CONSULTANTS**

From time-to-time, the IUCEA will draw manpower from experts available in the member universities in East Africa for specialized project activities.

**OTHER KEY PROJECT STAFF**

Other staff whose services will be required during the project will include Alvin Bagaka Manko (ICT Assistant) who will provide both administrative and technical assistance in the execution of the project. Mr Manko holds a bachelor of Information Technology from Jomo Kenyatta University in Kenya. He has also undertaken various computer courses.
4.0 Problem Statement

In 2003, participants in the largest international effort to direct the use and development of information and communication technologies (ICTs), the World Summit on the Information Society (WSIS), declared a common global desire and commitment to building a people-centred, inclusive and development-oriented society, one where everyone can create, access, utilize and share information and knowledge, enabling sustainable development and improving the quality of people’s lives (Bement, 2005). The challenge of WSIS, as defined in the Draft Declaration of Principles, is to harness the potential of ICTs to promote the development goals of the Millennium Declaration (Daly, 2003). Everywhere in the developing world, governments are launching ambitious ICT infrastructure initiatives, radically changing their communications policy frameworks and situating ICT at the heart of their development programmes and strategy. ICT is therefore becoming an indispensable tool in the fight against world poverty, as it provides developing nations with an unprecedented opportunity to meet vital development goals such as poverty reduction, basic healthcare and education, far more effectively than before.

The emergence of electronic forms of communication will enable African researchers leapfrog onto global frontiers of knowledge if the initial expensive investment can be made (Benneh, 2003). This important tool has, however, not yet seen its maximum potential in the said institutions in most parts of Africa, as few African universities have adequate resources to invest in the new technology. Furthermore, the information infrastructure in most of African higher education institutions is still very weak compared with the situation in developed countries.

Bandwidth, for instance, is proving very expensive in the region, and educational institutions are finding it extremely difficult to afford commercial prices, hence the need to lobby for free access or e-rates (Tusubira, 2007). However, educational institutions cannot afford to lobby for reduction on commercial prices on bandwidth single-handedly. They need to lobby as a team for the reductions and free access through regional bodies and consortia, such as the IUCEA and EAC. Universities will also need to encourage ICT skills development of staff through continuous education programmes. At the same time, the current status in the region requires innovative ways to support education-for-all (UNESCO-IITE Report, 2003).

Due to the increasing cost of information sources, library groupings in the form of consortia must be encouraged. This will enable the pooling of resources in order to jointly acquire information materials such as electronic journals and databases that are increasingly rising in cost and quantity. There is need therefore to use portal technology to provide services for researchers, including access to a uniform search interface that permits distributed searching of multiple electronic databases, websites, online library catalogues
and other electronic information resources, using a single search syntax (Kaane, 2007). This approach may be facilitated by the emergence of open source platforms that are increasingly becoming key for accessing and sharing knowledge/information (Shibanda, 2007).

Noting that education is one of the issues and challenges that can be defined within a regional context and which would be more effectively addressed through a regional approach, the fourth African Development Forum (ADF IV, 2004) emphasized the need to promote application of ICTs in this key sector at the regional level in order to leverage cross-border cooperation. Consequently, universities in East Africa are actively involved in a number of regional ICT initiatives, including Schoolnet Africa, Varsitynet, Out of School Youth Network, and Virtual Universities.

In the coming near and medium term future, therefore, higher education institutions in East Africa will be taking a great risk of being marginalized if they do not take advantage of the emerging educational technologies in the delivery of education (IUCEA Strategic Plan, 2006). The IUCEA, in collaboration with other partners, has a special role in addressing the policy, pedagogical, benchmarks and standards, content development and evaluation, ICT infrastructure, human resource development and curriculum development as the key issues in the technological transformation of higher education in East Africa (Wanjohi, 2006).

Consequently, within this project, the IUCEA seeks to address four key issues that are core within its recent strategic plan:

i) The need to explore distance education approaches, virtual university initiatives, and e-learning systems to open up access to higher education and to improve the teaching and learning processes;

ii) The need to make relevant information more widely available to stakeholders through electronic means in order to support the academic and research needs of universities;

iii) The need to enhance the capacity of academic staff and students to effectively utilize the opportunities provided by digital media and other ICT resources in teaching, learning and research; and

iv) The need to provide affordable bandwidth to enable universities access information and other academic resources available over local and global networks such as the Internet.

5.0 Project Aim and Objectives

The project aims at enhancing the capacity of East African universities in utilizing ICT as a tool for teaching, research, administration and community service. This will be done through development of appropriate physical and information infrastructures, innovative pedagogical approaches, and human
resource capacity improvement. This broad goal will be pursued through the following specific objectives:

i) To develop a framework for a shared e-learning system for universities in East Africa;

ii) To establish and manage online information resources for supporting East African universities in teaching, research and public service;

iii) To develop staff-training programmes in ICT that address strategic needs of universities in East Africa;

iv) To institute a common regional approach to reduce bandwidth costs.

6.0 Proposed Scope of Work

This section identifies the specific component activities and the strategies that will be put in place during the project execution phase in order to achieve the desired goals.

6.1 Promotion of distance education, virtual university, and shared e-learning platforms

Traditional education models will no doubt be unable to achieve educational empowerment effectively in the emerging knowledge societies. According to Tilya (2006), the reasons for the increasing interest in virtual education distil down to the achievement of one or more of three basic objectives: one, to increase access to learning opportunities by enhancing the flexibility of delivery modes or by eliminating geographic barriers to participation; two, to enhance the quality of the learning experience in terms of content or pedagogy; and three, to enhance institutional efficiency by reducing costs, increasing productivity or increasing market share. However, in a developing region like East Africa, where the ‘digital divide’ is more the rule than the exception, delivering instruction through the distance mode still presents a significant challenge to educators (dela Pena-Bandalaria, 2007).

ICTs provide an array of powerful tools that may help in transforming the present isolated, teacher-centred and text-bound classrooms into rich, student-focused, interactive knowledge environments (Omwenga, 2006). Consequently, e-learning is increasingly being suggested as an alternative to, or a way to enhance, traditional educational approaches since it can overcome many of the challenges involved in reaching underserved students. Creating common platforms that support interactive online work within a bandwidth-limited environment is a related component in efficient utilisation (Tusubira and Mulira, 2006). In this context, collaborations can reduce costs associated with designing and implementing commonly used e-learning platforms and courses (i.e. sharing of reusable learning objects housed in a common repository).
Within this project, this strategic objective will be pursued through the following two main activities:

i) Undertaking a survey to assess the existing distance education and e-learning approaches and systems amongst member universities;

ii) Developing a framework for a shared e-learning system (legal infrastructure, technological, pedagogical, etc).

One researcher will undertake this assessment. Using an appropriate sampling technique, at least 30 universities will be selected for the survey, six (6) from each of the five East African Partner States (Kenya, Tanzania, Uganda, Rwanda and Burundi). Of the six universities, four will be public and the remaining two will be private.

Within this survey, several methods will be applied to collect the data from the selected institutions, including literature study, face-to-face interviews, and open observation on location. Development of the data collection tools (questionnaires, interview schedules, etc) will be based on an assessment framework initially developed by the ADEA Working Group on Higher Education, but that has been significantly modified and adapted to suit the needs of the IUCEA.

Critical review of literature will be undertaken to establish state-of-the-art in online learning, learning methods and the software platforms that are currently used in this environment. A content analysis of past and present distance education and e-learning trends will serve to present a broad picture of the past and present application of technology within university education in East Africa, and will reveal progress made so far in the deployment of ICT into the teaching and learning process.

The interview technique will target the following categories of stakeholders: heads/directors of e-learning and distance education departments, academic staff (especially practitioners of e-learning), directors of university ICT services, and other e-learning experts and practitioners within universities. From a sample of these groups of stakeholders, data will be collected concerning the purposes, benefits and challenges of ICT, and the extent to which it is currently being utilized to support the core functions of the universities – teaching/learning, research and extension. Observation will be used at the institutions visited to verify what is available on the ground in terms of ICT utilization in teaching, including the e-learning platforms used currently, availability of ICT policy documents, and ICT facilities (hardware, software, networks, Internet, labs, etc).

The analysed survey data will then guide the development of a framework for a shared e-learning system. Borrowing from Norin and Stöckel (1998), the development of the framework, just like any software development project, will obey some kind of structure, following given timelines and entering
different stages during the development process – analysis, specification, design and implementation phases. Close attention will be paid to extensive user-developer interaction for requirements determination, testing, and acceptance activities, as recommended by Fowler (2005).

6.2 Establishing and managing on-line information resources (e-library, e-journals) for supporting member institutions in teaching, research and public service

A knowledge-based economy is characterized by a strong focus on R&D, which invariably gives birth to a culture of knowledge creation, knowledge export, knowledge acquisition, and knowledge application. Researchers in East African universities need regularly up-to-date literature in their libraries. Whereas access to information underpins all other activities of education, most universities in East Africa still report poor or minimal access to online journals to facilitate research. For national, regional and international networking and resource sharing, the availability of tools like directories, bibliographies, union catalogues, indexes and abstracts, databases, etc, are most essential.

The IUCEA is keen to support academic R&D by facilitating access to the world’s knowledge through a network of regional research libraries and information centres. The goal would be to enable people to have access to relevant information and to organize and use it. With decreasing shelf space and ever growing collections in the libraries, there is a need to pay greater attention to the conversion of automated libraries into electronic libraries and expanding local capacities in information science and communication technologies. An exhaustive survey is required to have authentic data on this.

Within this strategic objective, therefore, the following activities will be pursued:

- Organizing a study to identify the electronic resources (including national and international databases and repositories) that may support universities in their teaching, research and public service needs;
- Designing and developing a database-driven web portal that links stakeholders to relevant information sources and resources (e.g. libraries and other electronic databases).

Within the study, there will be extensive literature search, especially using Internet sources, to identify existing sources of information. There will also be structured discussion (interview) with librarians from selected universities in East Africa (using the same sampling techniques as described in 1. above). Other relevant national and international research organizations will also be targeted to collect the data. An information scientist will undertake the study.
Collected data will then enable the development of various databases that will be made available to stakeholders over the web. A database-driven web portal will be developed that links stakeholders to various sources of online information relevant for academic and research work.

6.3 Developing staff-training programmes in ICT to address strategic needs of member universities

For any meaningful development to take place or be sustained in any country, a critical mass of Science and Technology (S&T) human capital is mandatory (Barya, 2006). Especially in ICT and/or computing, the human capital is still very low in East Africa (Barya, 2006). ICT training, ranging from ICT literacy and technical development skills to the use of ICT in management and administration is ideal (Tilya, 2006). The AAU Working Group of Experts (2000) identified a number of human resources-related obstacles to the introduction and utilization of ICTs in African universities. These include: uncertain availability of trained technical and support staff; inadequate external and internal training programmes for critical skills to manage and support ICT functions; inability of institutions to ensure the retention of skilled staff due to poor remuneration; and inadequate human resources base for implementation of technical projects, particularly in the rapidly advancing ICT field.

With the increasing demand to employ ICT in all aspects of university activities including teaching, the need to enhance the capacity of academic staff and students to utilize these tools is urgent. There is also need for strategic capacity building of member universities, through administrative staff, in the management of ICTs. Within this project, therefore, the IUCEA has identified the need for training academic staff in order to improve their capacity to utilize ICT more meaningfully in teaching and research.

The following activities will inform this strategic objective:
- Undertaking a staff-training needs assessment for ICT in member universities;
- Developing ICT training programmes for academic staff based on the identified needs.

A training expert with ICT knowledge will be selected to undertake a comprehensive study to identify the gaps that currently exist within university academic staff in functioning effectively in the digital age. The needs assessment exercise will also be used to identify the areas in which academic staff require training to enable them use ICT tools more effectively in teaching and research.

Appropriate sampling techniques will be used to identify not more than six (6) universities in each of the five East African Partner States. The researcher
will conduct interviews with selected academic staff from these universities. This will be supplemented with other data collection techniques, including focus group meetings, questionnaires, observation, etc.

The data collected will be analysed and used in developing an appropriate curriculum for training academic staff in ICT. This curriculum will be used to conduct a pilot training on a sample of 30 academic staff selected from the participating universities in East Africa. Based on this pilot, the training programmes will be revised and disseminated for use within all universities in the region. The pilot group of trainees will be expected to implement this training within their respective universities, using the training programmes.

6.4 Instituting common/regional approaches to reduce bandwidth costs

Low investment in ICT infrastructure, coupled with high cost of connectivity and bandwidth, are the two major problems that hinder effective use of the resources available on the Internet (Omwenga, 2006). Due to high bandwidth costs, African institutions have to use limited capacity, leading to high inefficiencies in all operations that need access to the Internet – learning, research, communications, and regional as well as global market reach.

Researchers continue to suggest various strategies of mitigating this challenge, although not much has practically been achieved through these. Tusubira and Mulira (2006), for instance, have recommended a number of approaches, including large volume procurements (through consortia); good procurement practice, and efficient management and utilisation (human resource capacity); improvement of policy and regulatory environments (lobbying); addressing physical access constraints (technology); and targeted financial support (development partners).

It is due to increasing concern of member universities that the IUCEA would like to undertake a study aimed at coming up with practical strategies of reducing bandwidth costs for member universities. This study will start by reviewing the existing arrangements and initiatives that are currently in place to address this issue. This will be followed by primary research in order to come up with recommendations on how universities may access better bandwidth at reasonable costs in order to enable them to effectively participate more actively in the digital revolution that is currently sweeping across the world. The study will be undertaken preferably by a telecommunications engineer with wide experience in ICT and higher education in the region.
7.0 Conceptual Framework for the Project

This approach is summarised in the objective tree for the project (figure 3), a logical framework for the project (figure 4), a timeframe diagram (figure 5) and the project budget.

Figure 3: Objective Tree for the Concept Note

Capacity of East African universities to utilize ICT for sustainable development enhanced

Utilization of ICT in teaching, research, administration and community service enhanced

- A framework for shared e-learning system/platform developed and presented
- Conduct a study to assess the existing distance education practices and e-learning systems within member universities
- Develop a framework for a shared e-learning system
- Information resources for teaching, research and public service made available
- Carry out survey to identify information resources for teaching, research and public service
- Develop a database-driven web portal that links stakeholders to relevant information resources
- ICT staff-training programmes developed and validated
- Undertake ICT training needs assessment in member universities
- Develop ICT training programmes
- Pilot the training programmes on selected staff
- Appropriate strategies put in place for reducing bandwidth costs for universities
- Undertake a study on the strategies of reducing bandwidth costs for member universities
### Figure 4: Logical Framework

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<th>Objective Verifiable Indicators</th>
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<td><strong>Overall Goal</strong>&lt;br&gt;Capacity of East African universities to utilize ICT for sustainable development enhanced</td>
<td>Number of universities utilizing ICT in a meaningful way for sustainable development</td>
<td>Project report and developed tools</td>
<td>Universities recognize that ICT is a powerful tool for development</td>
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<td><strong>Objective</strong>&lt;br&gt;East African universities are utilizing ICT in teaching, research, administration and community service</td>
<td>Information on strategies to improve physical and information infrastructure, pedagogical practices and human resource capacity</td>
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<td><strong>Outputs</strong>&lt;br&gt;1. A framework for shared e-learning system/platform developed and presented&lt;br&gt;2. Information resources for teaching, research and public service made available&lt;br&gt;3. ICT staff-training programmes developed and validated&lt;br&gt;4. Appropriate strategies for reducing bandwidth costs for universities in place</td>
<td>1.1 Framework document/report&lt;br&gt;1.2 Web portal for universities; project report&lt;br&gt;1.3 Training programmes document&lt;br&gt;1.4 Document on bandwidth costs-reduction strategies</td>
<td>1.1.1 Access to report&lt;br&gt;1.1.2 Access to report; web portal&lt;br&gt;1.1.3 Access to document; trained staff&lt;br&gt;1.1.4 Access to report</td>
<td>University community is willing to participate actively in developing appropriate strategies to enhance ICT capacity for development</td>
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<td>1.1 Conduct a study to assess the existing distance education approaches and e-learning systems within member universities</td>
<td>1. Human resources (e.g. consultants) for surveys, training, analysis and administration</td>
<td>University community is willing to participate actively in developing appropriate strategies to enhance ICT capacity for development</td>
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<td>1.2 Develop a framework for a shared e-learning system</td>
<td>2. Hardware and software for information analysis and reporting</td>
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<td>2.1 Conduct survey to identify information resources for teaching, research and public service</td>
<td>3. Resources for communication (online and offline communication)</td>
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<td>2.2 Develop a web portal that links stakeholders to relevant information resources</td>
<td>4. Financial resources for travelling, hotel and meals</td>
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<td>3.2 Develop ICT training programmes</td>
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<td>3.3 Pilot the training programmes on selected staff</td>
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<td>4.1 Undertake a study on the strategies of reducing bandwidth costs for member universities</td>
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### Figure 5: Timing of Projects Activities

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8.0 Conclusion

The IUCEA is keen to use ICT to improve cooperation and collaboration between member universities. Within this framework, the IUCEA realises that cooperative agreements and the mutual utilization of resources aided by the application of new technologies for the storage, retrieval and dissemination of information, will lead to better services to meet the increasing demands for information from the users. This document has expounded on the strategy that the IUCEA will employ in order to enable member universities harness and exploit ICT as a tool to facilitate the achievement of their core business of teaching, research and extension, and to strengthen and widen the extent of cooperation and collaboration.
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<td>1  Promotion of shared e-learning platforms</td>
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<td>Assess the existing distance education and e-learning practices and</td>
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<td>infrastructure amongst member universities</td>
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<td>Develop a framework for a shared e-learning system (legal infrastructure,</td>
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<td>technological, pedagogical, etc)</td>
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<td>2  Information resources for teaching, research and public service</td>
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<td>Identify the electronic resources (including national and international</td>
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<td>databases and repositories) that are available for teaching, research</td>
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<td>and public service</td>
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<td>Develop a web portal that links stakeholders to relevant information</td>
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<td>3  Developing ICT training programmes to address strategic needs of</td>
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<td>Develop ICT training programmes based on the identified needs</td>
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<td>Pilot the training programmes on staff from 30 universities in East</td>
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<td>4  Instituting common/regional approaches to reduce bandwidth costs</td>
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<td>5  Administrative Costs</td>
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Table 2: Budget Details

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<th>1a</th>
<th>Assessment of Existing DE and e-Learning Approaches and Systems</th>
<th>ACTIVITY</th>
<th>QTY</th>
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<th>DAYS</th>
<th>RATE</th>
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Table 2: Budget Details...

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<td>Developing Strategies to Reduce Bandwidth Costs</td>
<td>ACTIVITY</td>
<td>QTY</td>
<td>DAYS</td>
<td>RATE</td>
<td>AMOUNT</td>
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<tr>
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<tr>
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<td>1,000</td>
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<tr>
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<td></td>
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<td><strong>16,050</strong></td>
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</table>

| TOTAL EXPENSES | 96,650 |
| Contingencies @2% of total expenses | 1,933 |
| **GRAND TOTAL** | **98,583** |
**Notes to the Budget**

Proper execution of the described project will cost an estimated GBP 98,583. Although the IUCEA has undertaken various projects in ICT before, funded by various bodies, the current project will depend wholly on the financing programme within MRCI. The table below lists some of the key projects funded so far.

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>FUNDER</th>
<th>YEAR</th>
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</thead>
<tbody>
<tr>
<td>1 Cooperative Research on East African Territorial Integration within Globalization (CREATING) (Development of the IUCEA resource centre)</td>
<td>European Commission</td>
<td>2008 – present</td>
</tr>
<tr>
<td>4 ICT and information needs assessment at universities in East Africa</td>
<td>Ford Foundation</td>
<td>2002</td>
</tr>
<tr>
<td>5 Establishment of appropriate ICT infrastructure at the Inter-University Council for East Africa Secretariat</td>
<td>Ford Foundation</td>
<td>2001</td>
</tr>
</tbody>
</table>

As described in the narrative, and outlined in the budget, this project proposes to undertake four major activities as per the project objectives. Each of these activities has been broken down to its constituent sub-activities depending on their nature. **Table 1** gives the global budgetary figures for each of the four (4) core activities (and the key sub-activities within each) that will be undertaken within this project. An additional 5th item has been added to the budget to cater for the administrative costs of the project.

A second table (**Table 2**) has been presented where details of the global budgetary figures (activities and their sub-activities) have further been broken down to specific items, giving the costs of each. Within this table, the unit of
measurement (quantity, QTY) of each activity is given, the duration of the activity (time, measured in DAYS), and the unit cost of each activity (RATE). The following notes give further explanation of the rationale within which the budget decision was arrived at:

1. The rates that have been given are the official rates used by the IUCEA for all its activities. For instance, it is approximated that preparation of the survey instruments for the various study-related activities will take about 5 days each, at a cost of GBP 100 per day;

2. As described in the proposal, the surveys will mainly be qualitative (and/or evaluative) in nature, involving mainly face-to-face interviews and observation at location. Consequently, it is expected that considerable travel will take place within the region, and air travel has been approximated at GBP 150. This is a conservative figure, taking into account the fact that there will be some road travel as well, in which case the consultant will be allowed to use personal transport (the IUCEA currently uses the rate of GBP 0.5 per kilometre). Participants in the ICT training programmes, however, will be expected to travel by public road service (approximated at GBP 50 per person).

3. Those who will undertake the various (specific) activities within the project (sourced from member universities) will be paid some reasonable allowance for their services (labelled consultancy fee). This rate will range from GBP 50 to GBP 100 per working day, depending on the nature of the activity.

4. Execution of the project will require constant communication (e-mail, postal, telephone, etc), use of stationery, and reporting (report writing). An allowance has been included in the budget to cater for these items within the various project activities.

5. There will be various studies undertaken within the project, involving the collection of huge amounts of data. A budget item has therefore been included in the relevant line activities for data presentation and analysis.

6. For proper execution of the project, various IUCEA staff will spend their time, over and above their normal work activities. To motivate these, the project has budgeted for a small allowance, based on each staff member’s expected input (time) and cost of their input (calculated based on an individual’s current salary). For instance, it is approximated that within the duration of the project, the IUCEA Executive Secretary will spend the equivalent of about one (1) month (25 working days) exclusively on activities of the project. Based on the current remuneration structure, it has been approximated that this will translate to GBP 100 per working day. The same case applies to other key staff within this project.
In addition, there are other staff who, because of the nature of their work, will support the activities of the project in various ways (e.g. accountants, secretaries, messengers, etc). These have been put together under the budget line “Other Staff”. The Project Team Leader (IUCEA Executive Secretary) will use his discretion to pay them allowances depending on their specific contribution.

7. A small contingency allowance at the rate of 2% of overall project costs has been included. This is the norm for projects at the IUCEA (although the rate is sometimes much higher depending on the nature of the project).
8. References


Tusubira, F F (2007) Regional issues – sufficiency and sustainability of access to the global information infrastructure. Paper presented during the Regional Symposium on University ICT and Library Services in East Africa organized by the Inter-University Council for East Africa, Jinja Uganda.


1. Name: Chacha Nyaigotti-Chacha
2. Birth Date: August 22\textsuperscript{nd} 1952
3. Nationality: Kenyan
4. Marital Status: Married with 4 children
5. Current Post: Executive Secretary
The Inter-University Council for East Africa
P O Box 7110
KAMPALA, Uganda
6. Permanent Home Address: c/o Nyancha House
P O Box 283
Kehancha – Kenya
Tel: Nyamtiro 6
7. Phone/Fax/E-mail: Office + 256 41 256251/2
   + 256 41 256906
   Mobile +256 772 622 887
   Fax: + 256 41 342007
   E-mail - cnyaigotti@iucea.org OR
   exsec@iucea.org OR
   chachanyai@hotmail.com
8. Education Qualifications: (a) S1 – Education Certificate
   (Distinction) Kenyatta University
   College (1972-75)
   (b) B.Ed (1\textsuperscript{st} Class Honours)
      University of Nairobi (1975-78)
   (c) M.A (Linguistics and African
      Languages) - University of Nairobi
      (1978-80)
   (d) M.Phil – Anthropological Linguistics
      Yale University – USA (1982-84)
   (e) PhD Anthropological Linguistics
      Yale University – USA (1984-87)
9. **Other Courses Attended**

   (a) Program for Strategic Leadership – Pennsylvania State University – U S A
   (b) Corporate Governance
       • Commonwealth Association for Corporate Governance – Kampala - Uganda
   (c) Performance Appraisal Skills
       • Consultants for Effective Training – Nairobi – Kenya
   (d) Leadership and Management of Change Programme
       • Eastern and Southern African Management Institute (ESAMI) – Arusha- Tanzania
   (e) Trusteeship Training
       • Corporate and Pension – Trust Service Ltd – Nairobi – Kenya

10. (i) **Academic Positions**

    (a) Tutorial Fell – 1979 – 1984 – Nairobi and Kenyatta Universities
    (b) Lecturer – 1985 – 1987 – Kenyatta University
    (c) Senior Lecturer – 1987 – 1990 – Kenyatta University
    (d) Associate Professor – 1990 – 1998 – Egerton University
    (e) Full Professor – 1998 to date – Egerton University (currently on Leave of Absence)

    (ii) Taught and Examined in other Universities such as:-

        o Yale University – U S A
        o Murray State University – U S A
        o Penn State University – U S A
        o Moi University – Kenya
        o Maseno University College – Kenya
        o University of Dar es Salaam – Tanzania
        o Makerere University - Uganda

    (iii) **Successful Post Graduate Supervision**

        14 Masters Theses
        6 Doctorates

11. **Administrative Positions**

    (a) Faculty Examination Officer 1987 – 1988 – Kenyatta University
(b) Chairman – Kiswahili & African Languages – August 1988 – July 1990
Kenyatta University
(c) Chairman – Languages & Linguistics Department – November 1991 – February 1992 – Egerton University
(d) Dean – Faculty of Arts and Social Sciences – February 1992 – June 1992
(e) Principal – Laikipia College Campus of Egerton University June 1992 – May 1994
(f) Principal – Kisii College Campus of Egerton University June 1994 – August 1995
(g) Secretary (Chief Executive Officer) Higher Education Loans Board – Nairobi – Kenya August 1995 to October 2000
(h) Executive Secretary Chief Executive Officer) – The Inter-University Council for East Africa (October 2000 – To-date).

12. **Research Grants Awarded**

From 1982 to-date – Awarded 10 Research Grants by various organisations such as the Ford Foundation, the IDRC of Canada, the National Council for Science and Technology (Kenya) and Deans Committee – Kenyatta and Egerton University.

13. **Conferences and Papers Presented**

From 1979 to-date – I have presented 30 papers in various local and international meetings and conferences.

14. **Publications**

From 1977 to-date – I have published 18 articles and papers and 11 books.

15. **Current Research Interests**

- Language Issues (Planning, Policy, Education and Development)
- Regional Integration and International Linkages in Higher Education
- Literary studies & Linguistics Theory
- Current Trends in Higher Education (Financing,Governances, Curriculum Reform/Development & Student Affairs)
- Gender Issues in Language and Literature
16. **Membership of Associations**

Since 1978, I have maintained active membership in a number of Academic and Development Associations including:

(a) The Association of Third World Studies – U S A
(b) The African Studies Association – U S A
(c) Society for International Development – Rome Italy
(d) Kenya Writers Association – Nairobi
(e) Chama Cha Kiswahili Cha Taifa – Nairobi
(f) The Association of Third World Studies – Kenya
(g) Chama cha Kiswahili – Afrika Mashariki
APPENDIX 2: CV FOR DR BEN MTASIWA

CURRICULUM VITAE

Name: Benedict Michael Mtasiwa

Gender: Male

Date of Birth: 9/January/ 1962

Nationality: Tanzanian

Host Institution: IUCEA

Education Profile

Tertiary and above

1998
• Awarded Ph.D – Structural Engineering (Concrete Technology) Graduate School of Engineering Hiroshima University – Japan

1995
• Awarded Msc – Structural Engineering (Concrete Technology) Graduate School of Engineering Hiroshima University – Japan

1986
Awarded Bsc – Civil Engineering – Edward Mondlane University – Maputo, Mozambique

Training and Seminars

1999
ISO (International Standard Organization), Implementation course for East African Countries – Zanzibar. Organised by ISO and facilitated by SABS(South African Bureau of Standards) and TBS(Tanzania Bureau of Standards)

2001
Advanced course in “Procurement and Tendering Procedures” organized by the Tanzania’s “National Construction Council”

2005
Attended the International seminar on “Development of Incubators” – Business and Technology incubator- in Batobeng Pretoria, facilitated by Experts from the University of Texas at Austin

2005
Attended the Intellectual Property Roving Roundtable for Small and Medium Enterprises (SMEs), sponsored by AR IPO, EPO and INPI-France at Silversprings Hotel – Nairobi, Kenya

EMPLOYMENT PROFILE

2006 to date
Projects and programmes Officer – Inter University Council for East Africa (IUCEA)
• Responsible for administration and coordination of Projects and Programmes (Academic, Research and Services) hosted or run by the IUCEA

2003 – 2006
Research and Development Director – African Institute for Capacity Development (AICAD), located near JKUAT Campus, Nairobi Kenya.

• Responsible for administering Research and Development Coordination that includes: Themes identification, selection of research projects, Budget correction, Monitoring and Evaluation, feedback process and way forward options’ design and implementation.

2000 – 2003 Lecturer – Dar es Salaam Institute of Technology (DIT) – (concrete materials and structures)

• Coordinator
  - Research and Consultancy Bureau (RCB) - Building and Civil Engineering Department Coordinator
  - Research and Projects for Engineering graduating students

• Secretary
  DIT – Exhibitions such as Africa’s intellectual property day, Dar es Salaam International Trade Fair and other exhibitions – national and international

• Founder and Chief Editor
  DIT Innovations guide book

• Sub-consultant
  Dar es Salaam – Bagamoyo Road project by the EU, Italian Government and DANIDA

• Management Consultant to a Contractor
  Bagamoyo - Mlandizi Rural Roads

1998 – 2000
Materials Quality Control Engineer
  Konoike Construction Co. Ltd
  - Dar es Salaam Roads Improvement Project (DRIP) phase I and II – JICA funded
  - Urban sector Rehabilitation Project in Dar es Salaam and Arusha – World Bank funded

1991 - 1992
• Structural Engineer (Buildings) Johnson Mayne International (TZ) Ltd
  - Responsible for structural design of the NBC headquarters and residential houses in Mombo district
  - Water supply tank for NBC staff houses in Tabora
- Structural design of NBC staff houses in Mwanza

1989 – 1991
- Inspector of works – Kapunga Rice Project
  Tan consult (TZ) – Sir William Halcrow and Partners (UK)-JV

1987 – 1989
- Design/site Engineer – National Housing Corporation
  Design and site supervision of the construction of Residential houses

1986 – 1987
- Design – Mozambican “consultor technico das obras pu-blicas” (COTOP)
  i.e. Technical consultant for public works
  Duty – Design of a Reinforced concrete bridge over Kondedzi River (Limpopo branch) along Dande – Mussacama Road.

PUBLICATIONS
Research

- Refereed
  (1) B.Mtasiwa, Ei-ichi Tazawa, Asuo Yonekura and Takahashi
    “Influence of type of superplasticezers on double mixing effect”

  (2) B.Mtasiwa, E.I Tazawa and Takahashi
    “Influence of type of dosing method of superplasticizers on double mixing effect
    *proceedings of JCI Vol. NO. 19*, 1997 pp-259-264

  (3) B.Mtasiwa, E.I Tazawa and Takahashi
    “Effect of Mixing and dosing methods of superplasticizers on fluidify of concrete

  (4) Ei Tazawa, B.Mtasiwa, Takahashi “Effect of types of superplasticizers and mixing methods on the properties of cementitions systems” 5th
    *ACI (American Concrete Institute)/CANMET( Canadian Centre for Minerals and Energy Technology) International conference held in Italy – 1997 pp-637-656

- Non refereed, 8 papers/ reports

Others - Reports and Consultancy Activities – On Job

• Monitoring and Evaluation of Post-Project “Impact and Sustainability” for the Dar es Salaam – fixed Telecommunication Rehabilitation Project

• Development of training curriculum for Practicing – Engineers, Technicians and Artisans in the field of communication – (Radio, Television and Computer) sector. Sponsored by the Tanzania Communication Commission (TCC)

• Development of proposals for solid waste management project in Mbagala – DSM – sponsored – “TEMEK E Municipal Council”, 2002 et.c
APPENDIX 3: CV FOR MR PHILIP AYOO

1. PERSONAL DATA

Name: Philip Ouma Ayoo

Address: P O Box 7110
Kampala – Uganda
Tel: +256-41-256251/2
Mob: +256-772-666507
Fax: +256-41-342007
E-Mail: payoo@iucea.org

Gender: Male

Nationality: Kenyan

Date Of Birth: June 16 1970

2. EDUCATIONAL QUALIFICATIONS

MPhil in Information Sciences – Dec 4 2001
Moi University
P O Box 3900
Eldoret – Kenya

BSc in Information Sciences – Oct 27 1995
Moi University
P O Box 3900
Eldoret – Kenya

IITE Specialized Training Course Information and Communication Technologies in Distance Education – Sept 14 to Dec 13 2003
Institute for Continuing Education (ICE), University of South Africa (UNISA)
P O Box 392
UNISA 003
South Africa

Presently Pursuing PhD in Information Systems – Since August 2005
Makerere University
P O Box 7062
Kampala – Uganda
3. WORK EXPERIENCE

**Electronic Database Specialist** – Sept 4 2000 to Present
*The Inter-University Council for East Africa (IUCEA)*

- Ensuring an effective, efficient and reliable ICT system in the Council
- Ensuring a proper and cost-effective maintenance of ICT infrastructure at the Council
- Creating an up-to-date resource centre which is fully ICT interactive
- Ensuring an efficient and reliable ICT connectivity for the Council
- Establishing and maintaining a functional, most effective, reliable and informative IUCEA website
- Creating and applying most efficient and relevant databases in support of the functions and activities of the IUCEA
- Working with member universities and all IUCEA stakeholders to maximize the utilization of ICT tools and technical know-how

**Graduate Assistant** – June 1999 to August 2000
*Department of Information and Media Technology, Moi University*

- Teaching undergraduate courses;
- Supervising undergraduate research projects;
- Examining courses taught;
- Undertaking research in relevant areas;
- Participating in faculty activities.

**Senior Technician** – August 1996 to May 1999
*Faculty of Information Sciences, Moi University*

- In charge of the management of the faculty’s Information Resources Laboratory;
- Organising the resources, both computerised and print, and maintaining the equipment (hardware and software);
- Assisting both teaching staff and students in using the facilities in the laboratory for their research and training purposes;
- Creating and maintaining the necessary databases and files for the various facilities in the Resource Centre;
- Cataloguing, classifying, indexing and abstracting new information materials for inclusion into the relevant database(s);

**Associate Consultant** – July to August 2000
*ComTech Systems Limited, Nairobi, Kenya*

- Teaching computer courses leading to proficiency certificates;
- Teaching the IMIS programme leading to a diploma in Computer Science;
- Designing course content and methodology;
- Examining trainees on the respective courses.
4. PUBLICATIONS


5. PAPERS PRESENTED AT CONFERENCES


From Distance to Online? The Impact of Technology on Education. A paper presented at a Workshop for Specialized Committee on Adult and Distance Education in East Africa, organized by the Inter-University Council for East Africa. May 18 – 19 2006, Dar es Salaam Tanzania.


Access and networking amongst institutions: the case of universities in East Africa. Paper presented during a conference on Contemporary Issues in Education: Globalisation and Local Empowerment, Makerere University, Kampala, Uganda

6. PAPERS ACCEPTED FOR PRESENTATION AT CONFERENCE

presented at the Annual International Conference on Computing and ICT Research, August 3 – 6, 2008, Makerere University, Kampala Uganda.