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ICT in Education in Africa - Myth or Reality: A Case Study of Mozambican Higher Education Institutions

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ABSTRACT

In the last decade, there has been a growth in Information Communication and Technology for Education (ICT4E) in sub-Saharan Africa. Through support from local and international development agencies, several Higher Education Institutions (HEIs) have engaged in introducing, implementing and supporting ICT4E. This study aims at providing a description and analysis of the current state of ICT4E implementation in HEIs in Mozambique. An exploratory study of 19 HEIs was conducted using open ended questionnaires and interviews. The results show that the country has advanced greatly in terms of design and implementation of ICT policies, as well as telecommunication. Additionally, MoReNet the national education research network supports ICT infrastructure capacity building in HEIs through its nationwide data network that interconnects academic and research institutions. Teacher centered approaches are still the dominant pedagogy.

Keywords

ICT for Education, Higher Education Institutions, Infrastructure, Policies, Mozambique

INTRODUCTION

Higher Education is one of the most important sectors for developing the human capital of countries to support innovation and find new solutions for sustainable and equitable growth. According to InfoDev (2010), ICT can be used to improve the quality of education by enhancing educational content development, supporting administrative processes in schools and other educational establishments, and increasing access to education for both teachers and students via distance or e-learning. In this context ICT can accelerate national development by improving governance and contributing toward the country's participation in the global knowledge economy.

The Mozambican higher education sector has grown significantly in the last two decades. From a starting point of three public universities in 1990, the Higher Education Strategic Plan (2000-2010) together with the Law of Higher Education in 1993 opened the higher education sector to private providers. This led to the creation of 41 more institutions of higher education. Currently, Mozambique has 44 institutions including 18 public and 26 private universities spread across all provinces of the country, with more than 101,300 students in total (MINED, 2011). The Ministry of Education (MINED) has projected a total of 170,398 higher education students in 2015 (MINED, 2011). Hence higher education is one of the priority areas in Mozambican ICT policy.

Mozambique is one of the least-developed countries (UNDP/HDI ranking 2011: 184 out of 187) with a 2007 population estimate of 23,929,700 inhabitants in 2012. Seventy one percent of the population live in rural areas and fifty two percent are illiterate (INE, 2007). According to UNDP (2008), Mozambique is still often cited as enjoying one of the highest growth rates in the world. After nearly three decades of civil war the Mozambican economy has recovered rapidly and achieved an average annual growth rate of 8 percent from 2002-2007 as result of an Action Plan for the Reduction of Absolute Poverty (PARPA) introduced by the government in 2001.

Subsequent Action Plans have sought to reduce the instance of food poverty from the current level of 54.7 percent to 42 percent by 2014 (IMF, 2011). One of the most important features of the latest Action Plan was the introduction of ICT with an "essential role in preparing and promoting economic growth through innovation" and "in poverty reduction" (UNDP, 2008). The Government of Mozambique recognizes the worldwide impact of ICTs and states in its poverty reduction strategy that while some significant reductions in poverty have been achieved, the potential effects of ICT are yet to be fully understood. However, some critics still doubt these capabilities and consider ICT as a luxury, especially by people living in poverty (UNDP, 2008).

There are disagreements about the usefulness and impact of ICT, but all stakeholders agree that education is one of the key factors for the development of a country. Many researchers and international development aid agencies have emphasized education as one of the pillars of development especially for poor countries by increasing access and improving the quality of education (UNESCO, 2005; Alam, 2009; Uvalić-Trumbić, 2010; MINED, 2011; Santibanez and Fox, 2011).

In order to make ICT accessible and useful for larger segments of the population, the government launched "the Mozambique ICT Policy" in 2000. The subsequent "Strategy for Innovation in Science and Technology in Mozambique" was initiated in 2002. This provides policy directives and strategies to encourage research, human resource development and knowledge transformation as part of national poverty reduction efforts (Rowan, 2003).

The monopoly of telecommunications by Telecomunicações de Moçambique (TDM) was challenged in 1992 when the national regulatory authority INCM was created with the mandate to regulate both the

Telecommunications and Postal sectors (Mabila, Mboane and Mondlane 2010). The Telecommunications Act of 1999 laid the foundations for a gradual deregulation process, starting with the authorization and tendering by new private mobile phone providers. Currently there are three companies competing (Mcell, Vodacom and Movitel). Nowadays, Mozambique is part of two regional and international connectivity projects, namely the SEACOM and EASSy submarine cables, which are creating considerable capacity and have improved the affordability of international bandwidth.

This study will describe and analyze the current state of implementation, institutional policies, ICT infrastructure, access and use of ICT, actors involved, institutional vision, pedagogical approaches, challenges, limitations, and current involvement in ICT4E activities in Mozambican higher education institutions. It also considers perceptions of the implementation, as well as the involvement of public and private institutions in supporting ICT4E activities.

METHODOLOGY

This section describes the data collection methods, the sampling strategy and the ethical issues raised by this study. The study collected qualitative data by means of a questionnaire with open ended questions. The questionnaire was designed to be easy to understand and was administered in Portuguese to all twenty eight HEIs for which we managed to get contact details. Fifteen of these were in the private sector and thirteen were public institutions. All these institutions were contacted and invited to participate by email and phone.

Responses were obtained from 19 institutions across the four provinces including twelve in Maputo, one in Gaza, three in Sofala, one in Tete, and two in Nampula. The responses were collected in the forms of thirteen questionnaire responses received by e-mail and six interviews based on the questionnaire. The interviews of between 30 minutes and 45 minutes in duration were used to obtain additional information, which was recorded and transcribed. All of these took place during face to face meetings at HEIs in the Maputo region. Responses were received from thirteen public and six private HEIs. In some cases when the returned answers were unclear, phone conversations were used to gain clarity. In addition, we managed to acquire official documents from several institutions including statements of institutional vision and strategic plans.

In the descriptive analysis the contents of the questionnaires and interviews were analyzed response-by-response, and then analyzed based on categories and subcategories of responses of the questions. These categories were partially identified a priori from the central questions of the questionnaire, and partially emerged from the text produced based on responses to the questionnaires. The data analysis process also included the comparison between the responses and information from documents like institutional vision, strategic plans, and project reports to augment the quality of information across the whole data set.

FACTORS FOR SUCCESSFUL IMPLEMENTATION OF ICT IN EDUCATION

In recent decades, scholars, and international organizations working in the field of ICT have studied different factors accounting for successful and failed implementations of ICT in Education. Depending on the level, the viewpoint or the focus, the factors of successful implementation of ICT can be categorized in different ways. Nachmias, Mioduser, Cohen, Tubin and Forkosh-Baruch (2004) analyzed literature from different studies and found the following perspectives: 1) organizational aspects, 2) institutional leadership, 3) the vision, and 4) resource allocation. Of importance are also teachers' beliefs and their education, structural factors within educational institutions, pedagogical approaches, and learning materials.

Hoffman (2001) argues that successful implementation of ICTs must focus on infrastructure, attitudes, staff development, technical and administrative support, sustainability, and transferability. Nachmias et al. (2004) suggested a framework to map the intensity of factors involved in the implementation of innovations using ICT, which is shown in figure 1.

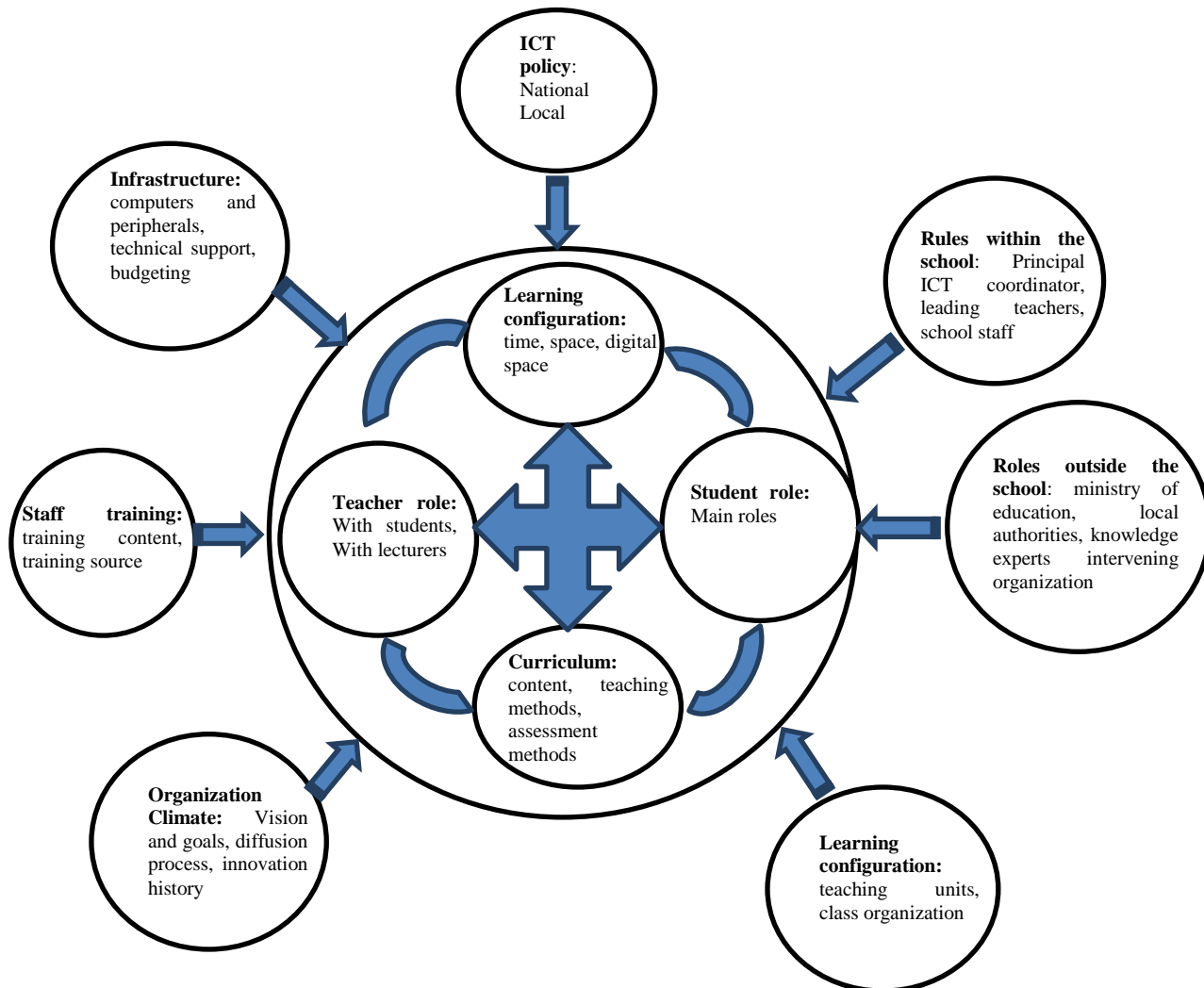


Figure 1: Configuration of the factors involved in pedagogical innovations using ICT (Nachmias et al. 2004).

This framework provides a useful overview of the major factors necessary for successful implementation of ICT in education.

Another interesting framework is presented by Mumtaz (2000) who listed the following factors that prevent teachers from using technology: 1) lack of teaching experience with ICT, 2) lack of on-site support for teachers using technology, 3) lack of help supervising students when using computers, 4) lack of ICT specialist teachers to teach students computer skills, 5) unavailability of computers, 6) lack of time required to successfully integrate technology into the curriculum, and 7) lack of financial support. All of these constraining factors are related to the success factors outlined by Nachmias et al. (2004). A key difference between these frameworks is that Nachmias et al (2004) expresses the preconditions for success and Mumtaz (2000) outlines the reasons for failure. Another difference is that

Nachmias et al. (2004) also includes external factors like national and local ICT policy, rules within the school and organization climate.

CASE STUDY ANALYSIS AND DISCUSSION

The two frameworks presented above were chosen because they present a variety of factors, and moreover, they provide different perspectives. Considering these more or less holistic perspectives we chose in this study to focus on what we believe are the most fundamental aspects in a successful implementation of ICT4E, namely ICT policies of government and HEIs, ICT infrastructure, access and use of ICT for education, and the organizations involved in and supporting HEIs.

Government and HEIs Policies

During the last decade many African countries have been developing and implementing ICT National policy with a focus on achieving social, economic, political and cultural development (IST-Africa Consortium, 2012). In many developing countries education, (and particularly tertiary education), is seen as one of the most important ways to improve economic growth and mitigate poverty. Thus when a country outlines ICT policy, education appears as one of the pillars that can lead to development. The national ICT policy of Cameroon includes among its objectives implementation of an ICT development program by the Ministry of Higher Education and the creation of multimedia resource centers at secondary and higher schools by the Ministry of Secondary Education. The national ICT policy of Tanzania indicates objectives to 1) transform the country into a knowledge-based society through the application of ICT for development; and 2) to deploy nationwide e-Education that supports schools and higher education/training facilities across the country by interconnecting them with each other and with relevant knowledge centers, providing curriculum integration while also generating information to better shape policies, strategic plans and tactical decisions for developing education and vocational training in Tanzania (IST-Africa Consortium, 2012).

The government of Mozambique approved a national ICT policy in 2000 and the Strategy for Innovation in Science and Technology in 2002. In 2002, the government approved an action plan that had as its main objective the design and implementation of strategic ICT projects in all sectors and institutions. According to the Mozambique ICT policy (2000), higher education and research institutions must play the major role in seeking and implementing solutions and methodologies which will allow the expansion of the use of ICT for production processes, the provision of services, as well as the improvement of teaching and learning, and research in order to improve the living conditions of Mozambican citizens.

The ICT policy contributed to other policies that have driven the development of the country in this area such as the Code of Fiscal Benefits first approved in 2002, which facilitates the acquisition and importation of goods and equipment for ICT investment. The benefit of this law is that institutions including education and research organizations can more easily import ICT equipment to facilitate economic development.

According to the questionnaire responses there is no legislation that stipulates that it is mandatory to use ICT for teaching, learning and research in Mozambican higher education. However all the respondents mentioned official documents such as strategic plans, institutional vision, and action plans for ICT within their institutions. ICT has been part of the referential framework of current government policies and this has influenced the referential frameworks of institutions of higher education. Unfortunately some of these institutions have very poor ICT infrastructure, and sometimes lack even a simple website for information. A HEI website would be a minimum requirement since it communicates institutional identity and provides basic information to the public.

ICT Infrastructure

Mozambique has made significant progress in terms of construction of telecommunication infrastructure (Dominguez-Torres and Briceño-Garmendia, 2011). Fiber optic cable connects the country and its neighbors to the nearby South Atlantic 3 (SAT-3) submarine cable. At the country level, the Mozambican telecommunications infrastructure consists of a national backbone, with a combination of submarine cable, terrestrial fiber, wireless and VSAT, covering all provinces up to the district level.

In terms of telecommunication infrastructure, the country is well covered by TDM. The national telecommunication company owns the backbone infrastructure and provides all fixed lines. Currently three mobile operators deliver services in the country and one of these was recently authorized to operate by the government to increase the mobile penetration rate and territorial network coverage, as well as to the improvement the quality of service through competition (Mabila et al., 2010).

Internet services are provided by Teledata (TDM subsidiary), INTRA Lda, iBurst Africa, Foris Telecom Mozambique, Tropicalweb, and EMIL, which offer hot spots with wireless services. The current coverage of their networks is limited to some provincial capitals and the surrounding areas. The TDM and mobile operators also provide Internet services in the rural areas.

All the universities that responded to the questionnaire have Internet connections with bandwidth mostly varying between 64 and 576 kilobits per second (kbps), but some of them do not have a functional website. Moreover, the Universidade Eduardo Mondlane (UEM) has its own independent connection directly to SECOM fiber optic cable with a capacity of 155 Megabytes per Second (MB/s). Universidade Pedagógica (UP), Instituto Superior de Ciências e Tecnologias de Moçambique (ISCTEM), Academia de Ciências Policiais (ACIPOL) and Universidade Politécnica are directly connected to the TDM fiber optic cable.

Apart from the infrastructure outlined above, there is the MoReNet project coordinated by Ministry of Science and Technology in partnership with Ubuntu alliance. The main objective of MoReNet is to provide a nationwide data network that will interconnect academic and research institutions, libraries, museums and non-governmental organizations (NGOs) to promote education, research and academic services (Mesquita, 2008). At the moment the project is in its pilot phase connecting six HEIs, three research institutions and the Mozambique national library—all of which are located in Maputo city and surrounding areas. MoReNet plays an important role in the implementation of ICT policy in HEIs. Its impact in the introduction of ICT4E and ultimately in improving access and quality could be even greater if there were a more integrated ICT policy for the whole HEI sector including the new and small HEIs.

According to the questionnaire responses the oldest institutions such as UEM, UP, Instituto Superior de Relações Internacionais (ISRI), ACIPOL, ISCTEM, Universidade Católica de Moçambique (UCM), Universidade Politécnica and Universidade São Tomás de Moçambique (USTM) and some public HEIs such as Universidade Zambeze (UniZambeze), Universidade Lúrio (UniLúrio), Instituto Politécnico de Gaza, Instituto Politécnico de Manica, Instituto Politécnico de Tete, and Instituto Superior de Transportes e Comunicações (ISUTC) invested heavily in infrastructure including Network Operator Centers, Local and Wide Area Networks, and computer rooms with at least 25 machines in each faculty or school. Within each institution, infrastructure is managed by an IT department. Institutions with campuses in different locations are connected through fiber optic systems or by wireless technology (eg. UEM, UCM, Unizambeze and Universidade Politécnica).

The other HEIs in this study have poor IT infrastructure. In some cases there is only a dial-up connection via a modem, a small server with some hubs, and a small LAN to distribute Internet access to a computer room, management rooms and lecturers' rooms. In some institutions the lecturers and students use the same computer room.

Access and Use of ICT for Education

According to Kozma (2008), the use of ICTs for learning encourages learner-centered learning, active, exploratory, inquiry-based learning, and collaborative work among learners and teachers. Such affordances of ICTs in education support the development of creativity, analytical skills, critical thinking and informed decision-making. So the introduction of ICT in education is important because of the changes it can have in different aspects of learning. However, the benefits of ICTs for students can only be achieved if the HEIs ensure access for all stakeholders and the ICT is used in teaching and learning, research and management.

Institutional websites provide important information that can form the basis for quality ranking of HEIs. The majority of the institutions in this study have a website. Judging from the questionnaire responses most of the public and older private institutions have established websites. However, almost none of the new private institutions have websites. Some of these institutions reported that their websites were under construction. Often the websites were shown as "under construction" for extended periods. The currently available websites range from rudimentary to advanced, depending on the IT capacity of each institution and/or the frequency of information updates.

The website of a HEI presents the institution as an organization with a specific vision and describes its faculties or schools and academic programs. In some institutions the website provides other relevant information such as academic regulations, admission requirements, and the rights and duties of students and the lecturers. Institutions such as UEM, UP, ISCTEM, UCM, Universidade Politécnica, USTM, and ISRI provide more information regarding the faculties, schools and departments. A few institutions included news about the HEI on their home page. The news items on the UEM site included text, images and some short videos. UEM and the Polytechnic University also included online radio information. Institutions like UEM, UP, USTM and ISRI have libraries accessible online while UDM shared some education materials for download.

According to the questionnaire responses all the HEIs have computer rooms for lecturers and students. Moreover, there is a nationwide program involving the HEIs, banks and IT companies that facilitates loans to both students and the lecturers to finance the purchase of a personal computer.

While bandwidth remains problematic and the overwhelming majority of students and lecturers don't own a computer the availability of both Internet access and Internet enabled devices is improving. In recent years, prices have decreased significantly with the emergence of new IT companies and new tools such as mini-laptops, tablets and mobile phones. With the new services offered by mobile phone companies, it is now possible to have Internet access anywhere in the country, regardless of the type of contract.

Despite limited student access to the Internet and some questions about quality, growing demand for higher education has led some Mozambican institutions such as UCM, UP, Polytechnic University, UEM, ISDB, ACIPOL and the Instituto Superior de Administração Pública (ISAP) to introduce distance education for some programs.

Pedagogy

Nowadays, HEIs must play a decisive role in stimulating innovation and knowledge creation and in the development of human capacity. In Mozambique HEIs are challenged to foster and promote critical thinking, problem solving competencies, collaborative work and ICT skills. Hayes, Schuck, Segal, Dwyer and McEwen (2001) identify the potential of the use of ICT to transform pedagogy (a) in a philosophical shift from a reproducing knowledge of others to students constructing knowledge; (b) in a pedagogical move from teacher-centered to student-centered learning activities; (c) in materials which increasingly focus on global resources; and (d) in the design of activities for more complex tasks and use of multimodal information. The introduction of ICT in education can play a central role in developing the teaching and learning models and in the transformation of the learning approaches from older teacher-centered approaches to more student-centered learning, which develops the skills needed in an increasingly globalized knowledge economy.

The documents of several of the HEIs spoke of needing adequate infrastructure, training of lecturers, using of ICTs for teaching, learning research and management, and shifting towards student centered learning to provide a quality education to growing student enrollments. Despite government recommendations that student-centered learning is required by current job market conditions most of the HEIs in this study were unable to move beyond a rhetorical commitment to transforming pedagogy. Across the institutions in this study teaching in most programs was still teacher centered. A few notable exceptions including UCM, ISAP and UEM, which used problem based learning, project oriented learning and problem oriented learning.

While use of the Internet as a tool of teaching and learning is still not seen as desirable by most Mozambican HEIs a few institutions were using a learning management system. A blended learning model was in use at UEM, UP, ISCTEM, ISAP, UCM, and the Polytechnic University. There were also some cases of completely online programs at UEM and some completely online courses at ISAP. Some institutions had introduced distance learning within a blended model, which included short periods of face-to-face interaction, and the delivery of study materials to resource centers in the form of CDs and various electronic devices and storage media.

Organizations involved in and supporting HEIs

In this section we were interested in exploring how the HEIs had funded their ICT infrastructure capacity building projects. Their responses showed that the operating and investment budgets of public HEIs were funded by the national budget. In parallel to this funding, they received funds from donors. Multilateral financial support could fund a wide range of spending on literature acquisition, research funding, scholarships for lecturers, and various kinds of equipment including ICT. With the growth of private HEIs the government introduced a new model of funding and support for both public and private institutions in the form of the Fund for Quality Improvement and Innovation (QIF), which is well supported by the World Bank.

QIF is administered by the Ministry of Education to provide financial support for investment in training and innovation in higher education. This program is intended to improve the quality and relevance of teaching and research, enhance the efficiency of management and administration, and to create courses and programs that are more flexible and responsive to the training needs of the labor market and entrepreneurship. Other international development agencies including UNESCO, UNDP, SIDA, Nuffic, DANIDA, IDRC and USAID have also been active in supporting ICT capacity building in Mozambican HEIs. The questionnaire responses indicated that most HEIs were supported by public and private

companies through cooperation agreements. In general, the public HEIs had better infrastructure than most private HEIs because they could access public funding and international aid.

Challenges and Limitations

According to the Higher Education Strategic Plan from 2011-2020 the major concerns of government were expansion, quality improvement and increasing access to higher education (MINED, 2011). These goals will be difficult to achieve with the current provision of ICTs in the Mozambican HEI sector. Some HEIs still have inadequate infrastructure and need to improve their technical capacity by training lecturers, researchers and technical staff in the effective use of ICT within their jobs. There is also a need to creatively embed the use of appropriate and cost effective technologies within HEIs throughout the country. For effective implementation some institutions still need to design action plans that require the use of ICT as a key tool for teaching and learning.

According to questionnaire respondents all lecturers have acquired computer literacy by attending in-service training courses or through informal learning at home or in the workplace. Some questionnaire responses indicated that junior lecturers were not properly prepared to use ICT for teaching; however, in some institutions lecturers had attended courses in student-centered approaches and the use of new technologies. Other institutions claimed that low usage of ICT resulted from resistance to change by some lecturers. It may be argued that the efforts of Mozambican HEIs to expand access through distance education and improve quality with the use of innovative pedagogies require a nationally supported training program for lecturers. At the same time the HEIs need to organize themselves better in order to fully implement the government's higher education strategic plan.

DISCUSSION

All new HEIs in Mozambique are legally required to have a 5-year strategic plan. Moreover, it is important to continuously update the strategic plan because it has an impact on the development of the institution, which is particularly important for public HEIs as government funds are allocated based on the strategic plans. In some private HEIs the strategic plans are outdated.

All the HEIs in this study stated that they have Internet connections. No university could function effectively without an Internet connection in an increasingly globalized world where use of computers and Internet enabled mobile devices is changing the way people are living and working. Thus ICT competencies and skill must be part of both government ICT policy and the experience of teaching and learning at HEIs.

Mozambican HEIs have exerted considerable effort to include ICT in the curriculum; however, there are still many problems including those related to unreliable infrastructure and sustainable funding. As a result of widespread access to mobile phones and the decreasing cost of mobile data services universities have an excellent opportunity to communicate with students across distances. As yet HEIs have not integrated and systematically made use of mobile interaction in services.

One of the challenges for an effective implementation and massification of ICT in Mozambique is the lack of electricity in most of the areas of the country. The most recent available statistics show that only some 18 percent of households have access to electricity (Mahumane, Mulder and Nadaud, 2012). Responses relating to student access to computers and Internet showed that most distance learning students were workers in the public sector with Internet access in their work place through the Govnet system. These public officials have the opportunity to continue with their studies without moving from their places of work. Some HEI students in remote rural areas access multimedia centers with a combination of different types of ICT as "Poles for face-to-face Support" (Brito, 2010). Over time

MoReNet is expected to deliver further improvements in Internet access, higher quality and lower costs within higher education.

Rodriguez (2010) asserts that in the “information and knowledge society...the school has lost its monopoly of transmitting knowledge.” Thus students and lecturers must evaluate sources and find several kinds of information. Often this information is circulated by ICTs within social networks.

Most experienced Mozambican lecturers said that ICT had never been part of their initial training (Muianga & Mutimucuo, 2011). There is a clear need for workshops or in service training in ICT4E and processes to encourage lecturers to conduct classes in blended formats (including online learning interactions), and to make selective use of the best online resources for their courses. The findings of this study include the introduction of blended learning by a few HEIs. Most distance education systems in Mozambican HEIs used a blended model including some face to face interaction with the exception of UEM, which used a fully online model.

The transition from a traditional teaching model to interactive learning is always linked to the development of the economy itself (Dwyer, Ringstaff and Sandholtz, 1990). This is consistent with the assumption among Mozambican HEIs that HEI infrastructure, use of ICT and teaching and learning approaches will evolve in parallel with national economic development.

It is important that the implementation of ICT is a well-planned process that takes into account short, medium and long term activities. It involves several aspects including the availability of financial resources, investment in adequate infrastructure and related software, the training of lecturers and technical staff, low cost access, as well as adjustments in teaching and learning approaches that are in use in the institutions. Only then can implementation be successful.

CONCLUSIONS AND RECOMMENDATIONS

The results show that Mozambican government policies encourage all HEIs to address ICT as a key issue for teaching and learning; however, there are still several persistent constraints for the implementation of ICT in higher education. This study highlights some relevant issues that may help the government and HEIs to implement and integrate ICT4E, as well as to reach some objectives of ICT policy in Mozambican HEIs.

The results show that ICT is part of strategic plans of all HEIs, but in practice it is still not used effectively in education. Some HEIs have developed ICT programs and ICT courses in other programs; however, there remain several HEIs that have a strategic plan but lack a clear action plan for ICT implementation.

Even though the government provides funding for quality improvements, innovation and ICT capacity building there are some institutions that cannot access this funding since they are not eligible according to the current rules.

Mozambique has made major progress in rolling out telecommunication infrastructure. Despite the TDM monopoly of infrastructure, the telecommunication infrastructure covers all provincial capitals up to the villages. However, there is still a need to expand the infrastructure to more remote areas. This effort is hindered by the fact that electricity is not available in all parts of the country. MoReNet is very important for HEI ICT infrastructure capacity building since it creates a nationwide data network that will interconnect academic and research institutions. Some HEIs benefitted from funding by the government and/or private companies and international development agencies have also contributed substantially to the ICT infrastructure capacity building in the country.

Student-centered approaches are part of strategic change plans for many HEIs, but all institutions are still using teacher-centered approaches. The introduction of distance education using online or blended learning in a few institutions demonstrates that there are efforts to increase access and to make use of innovative pedagogy. We conclude that the Mozambican HEIs are still far from meeting the objectives stated in the official “ICT Policy” and “The Higher Education Strategic Plan.”

In recent years, ICT market supply has improved and has been characterized by decreasing prices and increasing availability of alternative and cost effective technologies for connecting to the Internet. Programs to provide affordable financing to students for the purchase of computers have also increased their access to the Internet.

Despite the progresses showed in this study, there is a need for more intervention by the government and innovation by HEIs in order to achieve successful integration of ICT in HEIs in Mozambique. This emphasizes the importance of the quality assurance role played by the Ministry of Education.

Lecturers from all academic disciplines need access to training in a wider range of ICT competencies and pedagogical flexibility to use tools like Learning Management Systems and confidently apply innovative pedagogies within blended and online models. All institutions must be encouraged to have a strategic plan that includes ICTs that support innovative pedagogies.

The government should continue to support the use of ICT in HEIs to achieve the objectives of the national ICT Policy and higher education policy.

Further studies are needed in order to analyze other factors that can contribute to successful ICT implementation in higher education in the Mozambican context. Some important topics for further studies are: 1) student-centered learning as a pedagogical approach and as an approach to introduce ICT as a tool for teaching and learning, 2) lecturers’ perspectives and acceptance of ICT4E as tool for teaching and learning, and 3) students’ perspectives and acceptance of ICT4E as tool of learning.

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