

Final Report

Analysis of Existing ICT Infrastructure
&
Readiness for E-learning

Target Universities:
RUFORUM Consortium of Universities in Eastern and
Southern Africa

Universities Visited:
University of Zambia; Bunda College of Agriculture
(Malawi); Eduardo Mondlane University (Mozambique)
and Makerere University (Uganda)

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Introduction and Background

The Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) is an initiative by a consortium of 12 universities in East and Southern Africa to develop and strengthen human resource capacity for inter-disciplinary problem-solving. RUFORUM's mission is to foster innovativeness and adaptive capacity of universities engaged in agricultural and rural development to develop and sustain high quality in training, innovative and impact oriented research, and collaboration.

In order for the RUFORUM institutions to develop and sustain high standards of training, innovative and impact-oriented research, Information and Communication Technologies (ICTs) have been identified as a critical component. The RUFORUM consortium understands that ICTs have the capacity to revolutionise the following:

1. the way teaching and learning occurs – in terms of the vast information and knowledge that is currently available
2. the effectiveness of the links between the RUFORUM institutions and other institutions – in terms of research and knowledge sharing
3. the methods of communication within and between RUFORUM institutions
4. the collaborative initiatives – in terms of skills sharing and problem solving in the Agriculture Industry

This “ICT Infrastructure & Readiness for E-learning Analysis” is critical because:

1. it will inform all the stakeholders the true position of the RUFORUM institutions in terms of infrastructure readiness so that the implementation of such initiatives as e-learning can be structured appropriately – taking into account each individual institution's current situation.
2. it will provide the critical starting point for all initiatives that assume appropriate ICT infrastructure is in place.
3. it will provide the necessary guidelines in terms of priorities for funding for the RUFORUM institutions.
4. it will inform the Policies and Strategic Plans of the RUFORUM institutions.

Objectives of the Infrastructure & E-learning Readiness Analysis

The objectives of the infrastructure & e-learning readiness analysis are as follows:

1. To document the ICT infrastructure status in the RUFORUM institutions.
2. To document the status of ICT Policies and ICT Strategic Plans in the RUFORUM institutions.
3. To document the current positioning of e-learning in the university structures of the RUFORUM institutions.
4. To verify and document issues relating to e-literacy of academic staff.
5. To evaluate and document the support available from the ICT Departments in each institution.

Key Areas of focus

This analysis will take stock of the following:

1. Background Information on the university
2. Adequacy of ICT Department Support
3. Adequacy of ICT Policies
4. ICT Strategic Plan – and inclusion of e-learning
5. Whether there are university Committees that guide ICT implementation
6. University Strategic Plan – relation to ICT Strategic Plan
7. Positioning of the E-learning Function within the University Structure
8. Computer Access for academic staff and students
9. Adequacy and funding of the Internet Connection – bandwidth management
10. Adequacy of the Network Infrastructure – teaching areas
11. Network Security – network monitoring, centralised antivirus management systems, system updates for e.g. windows
12. E-mail Communication use for learning by academic staff and students
13. Adequacy of the university website
14. Computer Literacy of Staff and Students
15. E-literacy of Academic Staff – i.e. use of the computer as a ‘tool’ in the classroom
16. Documentation of other E-learning Initiatives in the university
17. Availability of E-learning equipment
18. Curriculum – its adequacy in preparing learners to integrate ICTs
19. Change management and the Environment at the university

University of Zambia (UNZA)

Situation Analysis

- I. This situational analysis is based on the information that I found on the University of Zambia Website and follow up discussions (24 July 2007) with the ICT Director Mr. Collins Chinyama. The situation on the ground in is:

Aspect	Findings	Recommendations
Background Information		
Network Infrastructure	<p>UNZA has an effective network infrastructure that is being upgraded in tandem with current technological trends.</p> <p>All buildings at UNZA are networked. However there are some rooms that don't have network points – e.g. more network points needed in rooms that are assigned as computer labs in Crop Science, Agribusiness/Economics, Animal Science and Food Science</p>	For those rooms that are not networked it will not be a major problem to add network points in them because the network infrastructure is already in all the buildings.
Internet Connectivity	UNZA recently upgraded its Internet connectivity to VSAT for both uploads and downloads (4MB downlink and 1MB uplink).	This is sufficient for as long as the available bandwidth is being properly managed to prioritize academic work.
Network Security	<p>UNZA has installed a smooth firewall (part of network security) that will allow systems such as e-learning to be available outside campus as long as the user has access to the Internet.</p> <p>An Antivirus System has been installed for the whole institution.</p>	<p>The firewall will enable systems such as e-learning to be available via the internet and accessible from anywhere.</p> <p>There is a need to beef up security by installing a system update server to take care of windows security patches updates.</p>
Technical Support	The ICT Department at UNZA is ably positioned to provide the technical infrastructure support.	The ICT Department currently has no capacity to support a university-wide E-learning System. There is a need for positions for: E-learning System Administrator; E-learning Technician and Instructional Designer/Content Developer
Training Unit	The Consultancy and Training Unit within the UNZA ICT Department is well positioned to continue offering the valuable ICT Literacy training to staff and students.	The Consultancy and Training Unit currently has no specific program to train academic staff in the use of a

Aspect	Findings	Recommendations
		computer as a tool in the classroom. However they have the capacity to give this training if they are trained to deliver it
Website	UNZA has a functional website on which a link to the e-learning server can be created.	A link to the UNZA E-learning Server can be created on the UNZA website
Email Communication	UNZA has a functional email system that can be integrated to the e-learning system.	
ICT Policies	The ICT Department at UNZA is working on ICT Policies that will guide the implementation and use of ICT's at the university.	The ICT Policies need to include a specific policy on E-learning at UNZA
Computer Access	<p>Some academic staff has computers and some do not. (Approximately 70% have and 30% don't have)</p> <p>There are 60 computers targeted for use by ALL undergraduates and 10 for post graduate in labs directly managed by the ICT Department.</p> <p>Schools within UNZA also purchase their own computers.</p> <p>School of Agricultural Sciences only has 5 computers assigned to Post Graduate students (3 in Crop Science Unit and 2 in Animal Science unit)</p> <p>School Agricultural Sciences has 24 computers assigned for undergraduate use (4 in the Soil Science Unit and 20 in the School of Engineering that are shared with other Schools)</p> <p>Generally the computers that are available are not up to date technologically – 6GB HDD, 130KB RAM, X486 Processor and most of them run Windows 2000</p>	<p><i>Computer access is critically low.</i></p> <p>There is an urgent requirement to properly equip computer labs that students will use for learning.</p>
ICT Strategic Plan and E-learning	The ICT Strategic Plan is silent on E-learning	E-learning does not appear anywhere in any university-wide planning. Different Schools are beginning their own e-learning initiatives.
Other E-learning	Generally a need for LCD Projectors dedicated	

Aspect	Findings	Recommendations
equipment	for teaching only.	

II. Discussions with the Director of Distance Education at UNZA (Dr Vitalicy Chifwepa) – 27 July 2007

The Directorate of Distance Education at UNZA has been in existence since 1966. It was set up primarily for the programs in the Schools of Education and Humanities. It has 9 Distance Education Satellite centers around Zambia.

- The project initially received funding from VLIR and the funds were used for training, installation of computers in the centers and purchase of a server. The project wound up before content for the programs in the Schools of Education and Humanities could be developed.
- The Directorate of Distance Education at UNZA recently partnered with African Virtual University on a project funded by African Development Bank. The project focuses on distance education in teacher development and emphasizes the application of ICTs in education.
- The ADB project in brief:
 - i. convert existing curricula to e-content
 - ii. Open Source approaches have been adopted so that the content can be shared under open source laws
 - iii. the development of Education and Humanities subject modules has begun
- The following equipment has been purchased under the ADB funded project – 30 computers, TV and Audio Visual equipment, editing software, 3 servers and a VSAT link dedicated for Distance Education. A Materials Production Center has been set up including a lab for materials production.
- A Distance Education Committee exists at UNZA but it focuses on the Schools of Education and Humanities only.
- The current Distance education Plan does not include a UNZA E-learning Strategy for all the schools at UNZA. The Director confirmed that it would be included in the 2007-2011 Strategic Plan that is still in the preliminary draft stages.

III. Other Pockets of E-learning Initiatives at UNZA

- School of Natural Sciences – they are offering a regional MSc program in Physics using e-learning
- School of Mining – they are offering another regional program through e-learning. The contact person is Professor Sinkala.
- School of Education and School of Humanities have already begun content conversion towards offering their programs electronically

IV. Access to Computers for the School of Agricultural Sciences

Location	Used By	Number of Computers	Comments
Soil Science Unit	Undergraduates	4 working 1 server & 1 scanner 4 not working	Room is small. Need for more network points
School of Engineering	Undergraduates in School of Engineering, Veterinary Sciences, Agricultural Sciences and Mines	15 working 5 not working	The specifications of the computers are outdated – 6GB HDD, 130KB RAM, x486 processors and running windows 2000
Crop Science	Post Graduates	3 working 1 not working	The lab is spacious - more computers can be added. There are desks as well
Animal Science	Post Graduate Students and Staff	2 working 3 old not working	
Agribusiness/Economics	None	No computers. Room used as storeroom	Potential lab

The following issues need to be addressed:

1. Structurally it is currently not clear where the function of e-learning/academic development/educational technology falls within UNZA. Much as School of Agricultural Sciences want to do their own thing it is important that this function is defined within the University Structure. During discussions with the VC it emanated that the Directorate of Distance Education was working on a new Strategic Plan (2007-2011) that would include the UNZA Strategies towards E-learning as a university-wide project.
2. The ICT Policies that are being developed need to be very clear about E-learning at UNZA. It is important to have an e-learning policy that will enforce the use of ICT's in teaching and learning, clarify intellectual property rights, clarify reward systems for innovative facilitators, address issues of Internet plagiarism, address access issues, etc.
3. The UNZA ICT Department is an important stakeholder in this process. It is important to involve them so that they understand the various School' needs (including School of Agricultural Sciences).
4. Even though this is an initiative from the School of Agricultural Sciences, other stakeholders from UNZA must participate so that there is no duplication of efforts – ICT, Directorate of Distance Education, School of Natural Sciences, School of Mining, School of Education and School of Humanities.
5. There is currently no ready technical support for School of Agricultural Sciences in terms of e-learning. Please note that e-learning support is specific as it is do with re-tooling and ongoing technical support for the facilitators. The ICT Department at UNZA is currently not providing ongoing academic development support in terms of the effective use of ICTs in teaching and learning (this is not about general ICT literacy =typing and accessing Internet. It is about using the computer as a tool in the classroom).
6. Specific Training programs need to be introduced at UNZA to take care of “teaching academic faculty to use the computer as tool in the classroom”.
7. Technically the following decisions have to be made:
 - i. Purchasing of an e-learning server (approximately US\$7000) or use of an existing server from the other e-learning initiatives at UNZA.
 - ii. Decision on E-learning platform to use. Open source platforms such as MOODLE used at Africa University is recommended. Its free and it works. It uses Linux as the operating system and MySQL as the database. It is important to know what platforms the other initiatives at UNZA run on so that we rationalize to one platform.
 - iii. There is a need for an E-learning System Administrator, E-learning Technician and Content Developer/Instructor.
 - iv. There is a need to develop the content for the new planned regional MSc Program to be offered by Crop Science – as a separate mini-project.

General and Other Recommendations

1. E-learning Champions already exist at UNZA – School of Natural Sciences, School of Mining, School of Education, School of Humanities and School of Agricultural Sciences. So far the e-learning initiatives have been disjointed and unplanned. A good starting point would be a university-wide e-learning committee.
2. The E-learning Champions at UNZA will be useful resources for encouraging other academics to use ICTs in teaching and learning.
3. It is important for UNZA to rationalize the various e-learning initiatives so that they pull resources together from the different possible sources of funding. E-learning content for UNZA must be situated on a central server for ease of management and quality control.
4. School of Agricultural Sciences at UNZA is ready to begin the process of implementing its e-learning project. A good starting point will be a Strategic Plan Document for the E-learning Implementation.
5. Exposure visits to other institutions is encouraged for the selected E-learning Committee. E-learning Champions must continue to be groomed.
6. All project proposals from School of Agricultural Sciences for funding must include contribution to UNZA Internet connectivity/infrastructure development and training for academic staff in the use of ICT's in the classroom and purchase of computers.
7. School of Agricultural Sciences and other Schools within UNZA must assist with lobbying the university administration, government and potential funders for support for ICT Infrastructure Development and Maintenance, Internet Connectivity and ICT Technical Skills continuous upgrading. Academic Staff must be able to articulate the benefits of technology so that they become the advocates since they are the intended beneficiaries.

Bunda College of Agriculture-Malawi (BCA)

INTRODUCTION

This analysis of ICT infrastructure and readiness for e-learning at Bunda College is an initiative from RUFORUM that has a vision for revolutionizing methods of teaching and learning within the consortium. Much as this analysis is an initiative from RUFORUM it is important that Bunda College owns the whole process and takes it forward.

Bunda College of Agriculture was established in 1967 and is one of the constituent colleges of the University of Malawi. It has three faculties and twelve departments that offer a range of Bsc, Msc and Phd programs. Even though Bunda is 40 years old computers were properly introduced to the college barely 10 years ago. The Library Department at Bunda is responsible for the implementation of ICTs and the support and maintenance.

Situation Analysis

This situational analysis is based on the information that I gathered from discussions with the College's top management and later with Mr Emmanuel Fole (Technician) and Mr Kondwani Munthali (ICT lecturer from the Basic Sciences Department). My findings are itemized below:

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/ Recommendations</i>
Background Information	Public institution run under a federal system with some degree of autonomy. 800 students and over 100 academic staff	College Principal affirmed support for ICTs & said the spirit is there at Bunda, what is lacking is “how to begin”
Technical Support – ICT Department	The ICT Dept as a standalone unit does not exist – the Library is in charge Staff that are responsible for ICTs are: Librarian, Assistant Librarian, and 3 Technicians housed in APATU, Aquaculture and Basic Sciences Dept The Librarian is responsible for Network Administration, Systems Administration, Hardware & Maintenance, User Support and Troubleshooting	An ICT Department needs to be urgently established at Bunda to take care of the critical implementations, support and maintenance. The ICT Department will take leadership and plan for ICTs at Bunda Staff that currently support ICTs at Bunda could be co-opted into the new department.
ICT Policies	The College Strategic Plan singles out ICT Policy Formulation as a critical objective The ICT Policy is being developed	I did not see the policy thus am not sure what it says about e-learning. The Technicians that provided me with this information are not involved in this Policy Formulation.
ICT Strategic Plan	I did not see the ICT Strategic Plan	
Computer Committee	I understand a Computer Committee exists but I did not meet the chairperson to understand the role and composition of the committee	
College Strategic Plan	A College Strategic Plan exists. ICT implementation is covered as a sub pillar of Capacity Building	I would have put ICT as a pillar on its own. ICTs support every aspect of an educational institution and they require huge expenditure.
Function of e-learning	The College does not yet have an e-learning vision and plan. No specific unit has been identified to handle e-learning	It is recommended that the function of e-learning falls within the ICT Department – and that a specific position be created to

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/ Recommendations</i>
		support e-learning initiatives.
Computer Access – Staff	90% of staff have access to computers	
Computer Access – Students	<p>A total of 68 computers are available to students. Some of the computers are designated to undergraduates only some to postgraduates only and some to students in specific faculties.</p> <p>Students have very limited access to the Internet. Internet in the library is paid for. Computers at the Computer Center were removed from accessing Internet because of virus problems and “misbehavior” by students</p>	Student access is critically low. It needs to be prioritized. A budget line must be committed for the purchase of computers for student learning
Specification of Computers	<p>There is a mixture of old and new computers (<10GB HDD up to 80GB HDD; 64MB Ram up to 512MB RAM; <1.6 Ghz Processor speed up to 3GHz)</p> <p>The brands of computers vary as well.</p> <p>There is no centralized purchasing of computers – each unit or faculty does its own purchasing</p>	<p>There is a need to dispose of the very old computers.</p> <p>There is a need to centralize and rationalize the purchasing of computers so that a certain standard and brand is maintained for ease of support and spare parts.</p>
Internet Connectivity	<p>Bunda College is connected through VSAT (512kb/128kb) via Taide. Taide is also the service provider for Chancellor & College of Medicine.</p> <p>Cost is US\$2,150 per month</p> <p>Internet Connectivity is slow because of: mixture of hubs and switches on the network, virus problems and non updating of windows security patches.</p>	University of Malawi and other universities and colleges in Malawi could negotiate for lower rates as a consortium. Other countries have formed Educational & Research Networks that have successfully negotiated for cheaper bandwidth
Bandwidth Management	There is no bandwidth management being done. Thus no prioritizing of functions such as the library users and academic searches.	It is critical to manage the available bandwidth rather than increasing the bandwidth – a hardware or software solution could be implemented.
Network Infrastructure	<p>The Local Area Network covers all buildings. Even though there are some buildings with cables going through windows to enable connectivity.</p> <p>The Bunda Network was designed and implemented by an external consultant. Buildings are mainly connected via fibre.</p>	Network Diagram received and topology confirmed.

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/ Recommendations</i>
	A mixture of hubs and switches are used. There is no standardization of network equipment. The network topology is a star with the central hub in the Library Teaching places (lecture theaters, lecture rooms, conference rooms and labs) have no network points	
Network Security	Bunda has a software-based firewall Users do not log onto the network because the user accounts management system has not been implemented. There is no reliable centralized anti-virus management system There is no Windows System Update Server	There is an urgent need to install a server for managing network users There is a need to purchase a server and an upgraded anti-virus system and centralize anti-virus management There is a need to purchase a server for managing Windows System Updates
Email Communication	The university has a web-enabled email communication system. This system is for staff only and it has not been extended to students.	Email communication is the starting point towards introducing e-learning. Thus the Bunda email system must be extended to students.
Software Licensing	The Windows Operating System Software and the Microsoft Office Software at Bunda College is not properly licensed and this could have serious legal implications.	There is an urgent need to engage a reliable Microsoft representative who can advise on affordable licensing for educational institutions. There is also an option of applying to become a member of the Microsoft Academic Alliance – whose benefits include access to all Microsoft software as long as it is used for academic purposes.
University Website	Bunda College has a working website with valuable information.	
Computer Literacy Training – Staff	There is no organized and mandatory computer literacy training for academic staff	A policy needs to be put in place to enforce training of academic staff in Basic computer skills.
Computer Literacy Training - Students	The Basic Sciences Department carries out training in Basic Computer Skills for all students.	A bigger lab is required with a white board and dedicated LCD – one of the bigger labs could be swapped for the Computer Center lab.
E-literacy - Staff	There is no higher level training program to	Such a program needs to be

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/ Recommendations</i>
	groom academic staff to use the computer as an effective tool in the classroom.	introduced and it would be a follow-up to the basic computer literacy program.
Other E-learning initiatives	Malawi Polytechnic has begun e-learning initiatives.	Bunda College could engage Malawi Polytechnic to learn how they are going about it.
E-learning equipment	Equipment dedicated for teaching – LCDs, Laptops, Headsets, Microphones, white boards – is scarce.	There is a need to equip each lecture theater and room with a mounted LCD projector, laptop and white boards
Technology Fees	Students at Bunda pay a tuition fee that is not broken down. ICTs cost money and it is important to develop a culture of students paying for technology improvements via a Technology Fee. This could start as minimal fee so as not to scare them, then it could gradually increase.	This money can be used for maintenance and replacement of small things like mice, cables, etc
Change Management & the environment	The spirit for moving ahead certainly exists. The environment is conducive. Both academic and technical staff are enthusiastic about the e-learning program.	There is a need to begin to implement things that don't require huge financial resource outlays – e.g. Policies, Plans, Training, Marketing of e-learning, etc.
Tour of facilities	Bunda College of Agriculture has excellent physical teaching facilities. These facilities lack network points, mounted LCD projectors and white boards.	The era of green boards, chalk and dusters is over!

Computer Access – Revisited

<i>Access Point for Students</i>	<i>Number of PCs</i>	<i>Potential Number</i>
Library Internet Cafe – students pay to access	10	25
Library Information desk – free for academic access	3	
Agricultural Engineering	2	10
Computer Center (for training and use by undergraduates)	25	35
Aquaculture (undergraduates)	6	
Aquaculture (post graduates)	4	50
Development Studies (undergraduates)	11	
Development Studies (post graduates)	2	13
Animal Science (post graduate)	2	10
Forestry & Horticulture	3	15
APRU (<i>not for use by college students</i>)	10	50
<i>TOTALS</i>	78	208

General and Other Recommendations

1. A dedicated technical ICT support Department needs to be urgently setup – otherwise the implementation of ICT projects will be hampered. The people currently maintaining ICTs could be co-opted into the new department without looking to fund new people. The critical positions are **ICT Director, ICT Secretary, Network Administrator, Systems Administrator, E-learning Technician and ICT Support Technician.**
2. Bunda College of Agriculture is ready to begin planning the implementation of its e-learning program. The planning should begin with:
 - a. the creation of an E-learning Vision for the college.
 - b. Development of an E-learning Plan
 - c. Completion of ICT Policies
 - d. Development of an ICT Strategic Plan
3. The training of staff in Basic ICT Literacy could also begin.
4. Resource mobilization through donors and the government could be pursued.
5. The implementation of the gaps in the infrastructure analysis need to be addressed urgently.
6. Computer access for students needs to be urgently addressed as an ongoing project.
7. ICT expenditure needs to be co-opted as part of the general university budget.
8. Students must begin to pay a technology fee that will help towards upkeep of ICTs.
9. There is a need to rationalize computer lab spaces, computer equipment and access to LCD projectors – e.g. A bigger lab could be fully equipped with computers for access by all undergraduates and also for teaching. Another lab could be fully equipped and available to post graduate students. LCDs could be centrally managed for the benefit of teaching and learning.
10. Exchange visits between Bunda College and Africa University are strongly recommended – for ICT Support staff and Academic Staff.

Eduardo Mondlane University (UEM)

Situation Analysis

The information that makes up this situational analysis was provided by the Director of the Faculty of Agronomy at UEM (Dr Andrade Fernando Egas), the Director of the Center for Informatics at UEM (Dr Francisco Mabila) and the Director of the Center of Distance Education at UEM (Dr Gulamo A. Taiu).

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/Recommendations</i>
Background Information	UEM is the oldest institution of higher education in Mocambique – 45 years old. It has 14,000 students, 1200 staff and has the following 9 campuses not physically located in the same geographical space - Main Campus, Engineering, Medicine, Architecture, Law, Veterinary, Tourism & Catering, Rectorate, Marine & Coastal Studies UEM is made up of 14 Faculties and Schools, 10 Research and service centers and 3 Museums	There is support for ICT implementation by the highest governing body at UEM. The Director of CIUEM is a member of the university Board and the University Council.
Technical Support – ICT Department	The ICT Department exists & its 24 years old - called CIUEM. It is made up of a total of 70 staff and 9 Departments. The mainstream university budget has a component of ICT planned expenditure & its growing The ICT Department has a training unit that has capacity to offer ongoing ICT literacy training to staff.	The ICT Support Structure is adequate and sufficient to support the technical infrastructure and the integration of ICTs for teaching and learning at UEM The ICT Director did not know much about RUFORUM – Faculty of Agronomy needs to market RUFORUM to all the stakeholders at UEM. The exact % figure of the ICT budget compared to the total UEM budget could not be ascertained.
ICT Policies	ICT Policies exist. The policies are specific when it comes to e-learning - “UEM will use e-learning”	Good
ICT Strategic Plan	An ICT Strategic Plan exists and it is very specific about the integration of ICTs for learning which is the core business of UEM. “UEM will use e-learning and the Learning Management System is KEWL – Knowledge Environment for Web-based Learning”	Good
Computer Committee	No Computer Committee as such. Director of ICT belongs to the Board and the University Council. Through these platforms, ICT issues become part of	

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/Recommendations</i>
	the agenda and are prioritized.	
College Strategic Plan	It says ICTs are important.	Much as UEM has taken steps to prioritize ICTs the Director of ICT conceded that there was still much to be done in terms of increased awareness on the benefits of ICTs.
Function of e-learning	The Information Services and Content Development Unit in the CIUEM has the responsibility for developing and maintaining the Learning Management System (KEWL). KEWL is an open source platform being developed under the AVOIR initiative led by the University of the Western Cape. The Center for Academic Development at UEM is responsible for academic staff development and training – Teaching Methodologies course. The Center for Distance Education is responsible for training academic staff in e-content development. The Center has developed an implementation framework for fully online programs development – this includes Center for Distance Education, concerned faculty and the ICT Department. The Center for Distance Education has developed templates that faculties use to convert paper-based content to e-content.	The e-learning function is the responsibility of the following units – ICT Department, (Learning Management System & Network) Center for Distance Education (Training & Content Development), Center for Academic Development (Training & Academic Development) and the Faculties (e-Content Development).
Computer Access - Staff	UEM has a total of 3,500 computers. 60% of the computers are used by administration. 40% of the computers are used by students and academic staff.	
Computer Access - Students	Access to computers by students is critically low. For example in the faculty of Agronomy 50 computers are assigned to 600 undergraduates. 25 computers are assigned to postgraduate students who generally bring in their own computer equipment.	
Specification of Computers	The computer specifications are generally up to date	
Internet Connectivity	UEM have their own fiber optic gateway to the Internet (3.5Mbps/3.5Mbps) – US\$10,000 monthly subscriptions. With funding from the World Bank a separate Internet Connection has been established via VSAT (6Mbps/2.5Mbps) – US\$23,000 monthly subscriptions. UEM is also an Internet Exchange for Mocambique and is an ISP for a number of customers.	The modalities and plans for setting up a Mocambique Educational & Research Network are at an advanced stage. Through such a consortium it will be possible to purchase bandwidth at affordable rates.
Bandwidth	Network monitoring and bandwidth management is	

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/Recommendations</i>
Management	being done but there is room for improvement.	
Network Infrastructure	All buildings are part of the university LAN. All teaching rooms have network connectivity. The network topology is a combination of a star and ring. The remote campuses are connected via wireless. UEM has deployed wireless connectivity at the main campus	Confirmation of network topology by Francisco. Confirm which other remote campuses have wireless connectivity
Network Security	UEM has an effective firewall, Centralized anti-virus management and users log onto the network domain. The windows system update server is being planned.	Confirmation of type of firewall Confirm if there is an authentication server for the wireless network.
Email Communication	The UEM email system is web-enabled and available to both students and staff.	Gradually the importance of email as a learning tool, communication tool and information-provision tool is being recognized.
Software Licensing	UEM is working on a centralized software licensing solution for the Windows Operating System and Microsoft Office Software.	
University Website	UEM has a website that provides valuable information.	
Computer Literacy Training - Staff	Training of academic staff initiated by faculties. If CIUEM provides the training, faculties pay for it.	To find out if all faculties plan ICT Literacy training for staff? Is there a Policy to enforce and ensure staff do get trained?
Computer Literacy Training - Students	The training of students in ICT Literacy is the responsibility of faculties.	There is mandatory ICT literacy training for Faculty of Agronomy students but I could not verify if there is mandatory ICT Literacy training for ALL students.
E-literacy - Staff	Generally staff e-literacy is continuing to grow.	
Other E-learning initiatives	The faculty of Education at UEM has been involved in e-learning for some time. A number of their courses are in electronic format and have been uploaded on a Learning Management System called MOODLE. However this content will be converted to the KEWL system that has been selected to be used by the whole university. The Faculty of Economics has developed e-content for the Bachelor of Business Management that will be offered in a fully on-line mode, beginning 2008.	

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/Recommendations</i>
E-learning equipment	Faculties plan and budget for their needs. The Faculty of Agronomy is well equipped in terms of white boards, mounted LCDs and laptops for teaching. There are advanced plans to upgrade all teaching rooms in the Faculty of Agronomy.	I could not visit all the teaching rooms because UEM is huge but I was assured that all teaching rooms are being equipped with white boards, LCDs and laptops or instructor workstations.
Technology Fees	Students currently do not pay Technology Fees. However these will be introduced soon.	It is important to develop a culture of students paying for the Technology Services. ICTs require huge expenditure and outlays.
Change Management & the environment	The support for ICTs and change in the teaching methods exists in the highest governing body. Most lecturers appreciate the benefits of ICTs in the delivery process. The Director ICT however said there was still room for improvement in terms of awareness among all the stakeholders.	
Tour of facilities	UEM has impressive teaching facilities that are: fully networked, white-boards are being installed, LCDs are mounted or being mounted and there are laptops/workstations for teaching & learning.	

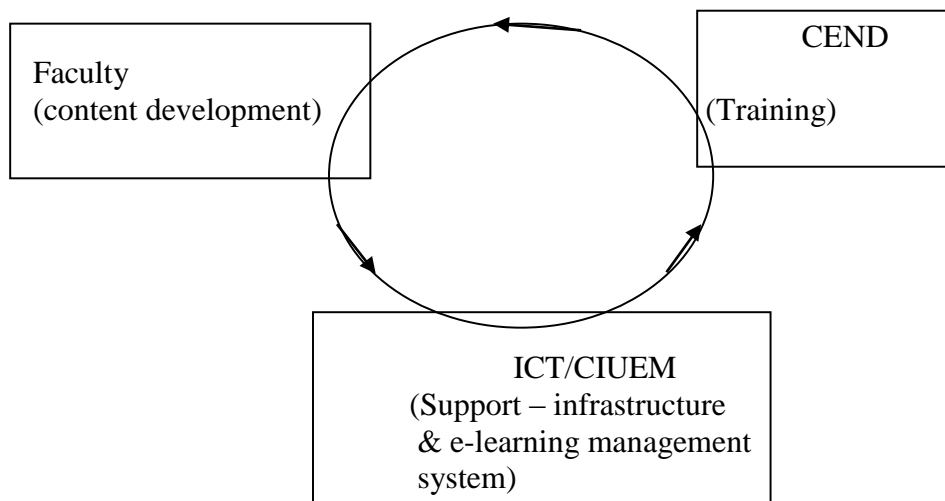
ICT Department / CIUEM

CIUEM is 24 years old and the organizational structure for the center is adequate to support the ICT infrastructure and the integration of ICTs for teaching and learning. CIUEM is based at the main campus (70 employees and 9 units/departments) In each remote campus there is a focal point person that liaises with the main campus for ICT support issues. UEM is a member of the African Virtual Open Initiatives & Resources consortium led by the University of Western Cape for the development of the KEWL Learning Management System virtual platform.

Center for Distance Education / CEND (Centro de Ensino a Distancia)

CEND is made up of 10 staff led by the Director Dr Gulamo A. Taiu. Staff in that unit are adequately trained with Masters degrees in Distance Education. They have also been fully trained in e-content development, pedagogy and instructional design. The mission of CEND is to coordinate the distance education activities developed in all units of UEM - namely the faculties and schools. CEND was created to address the problem of over-subscription to learning places at UEM (e.g. in 2007 13,137 applicants for 2,559 spaces).

UEM has established a framework for developing e-content for the programs that are to be offered fully on-line. The framework has three important stakeholders: Center for Distance Education, Faculties and the ICT Department:



The Faculty of Economics at UEM has developed fully on-line Bachelor of Business Management program using the support framework shown above. The program will be offered through Distance learning using ICTs beginning 2008.

General and Other Recommendations

1. Eduardo Mondlane University is clearly ahead in terms of planning for and implementing e-learning. The support structures are well-established and the roles have been clarified.
2. Other faculties at UEM can learn from the Faculties of Education and Economics at UEM that have already developed electronic content for their degree programs.
3. The Center for Academic Development housed in the Faculty of Education is strategically positioned to continue to offer the compulsory Teaching Methodologies course to all the academic staff. However this course needs to be reviewed and updated to include the new technologies that can be used by the facilitator of learning – use of the computer as a teaching tool (email, chat forums, discussion forums, blogs, wikis, podcasts, using LCDs and other updated teaching equipment)
4. The efforts to setup the Mocambique Education & Research Network must be vigorously pursued as a strategy to reduce the high costs of Internet Connectivity – the economies of scale that will accrue as a consortium will reduce the cost of bandwidth.
5. The funding of the bandwidth through donor funds is risky in the event that those funds become unavailable. Bandwidth costs must be part of the university mainstream budget.

Makerere University (MAK)

Situation Analysis

The information that makes up this situational analysis was provided by the Directorate of Information and Communication Technology Systems representative, Deputy Dean Faculty of Agriculture, Deputy Registrar School of Graduate Studies, Center for Distance Education and Institute of Adult & Continued Education. The findings were gathered during one day. The Director of Information and Communication Technologies was not available and I left a questionnaire to be completed and returned to me, it was completed and emailed to me.

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/Recommendations</i>
Background Information	MAK is the oldest institution of higher education in Uganda – 85 years old and one of the oldest in Africa. It has over 32,000 students, over 2,000 staff and has 22 faculties and offers day, evening and distance academic programs. There are 3 additional remote campuses: Agricultural Research Institute, Medical and Business schools. The annual MAK budget is US\$56 million.	There is support for ICT implementation by the highest governing body at MAK. The The university Strategic Plan identifies ICTs as a critical pillar.
Technical Support – ICT Department	A fully fledged ICT Department exists. The mainstream university budget has a component of ICT planned expenditure. However most of the funding is donor or project dependent.	The ICT Support Structure is still to be verified. DICTs to supply the structure. 2% of the university budget is dedicated to ICT expenditure.
ICT Policies	ICT Policies exist. The policies are specific when it comes to e-learning - “MAK will use e-learning”	Good
ICT Strategic Plan	An ICT Strategic Plan exists and it is very specific about the integration of ICTs for learning which is the core business of MUK. “MUK will use e-learning”	Various e-learning platforms are used – African Virtual University platform, Blackboard, KEWL, University of Florida platform among many others.
Computer Committee	A Council ICT Committee guides the implementation of ICTs.	
University Strategic Plan	MAK strategic plan says ICTs and e-learning are important.	
Function of e-learning	An e-learning unit is in place. It has been housed in DICTS but is now hanging and has been returned to the Deputy Vice Chancellor's Office. This unit has been engaged in training staff and maintaining the e-learning platform. The Center for Distance Education and Adult Education would like the e-learning unit to	MAK is still to determine where to place the e-learning unit on the MAK organizational structure. This is a policy issue. E-learning initiatives began in 1999 but the structural issues

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/Recommendations</i>
	be made part of their center.	are still hanging.
Computer Access - Staff	MAK has a total of 5000 computers. X% of the computers are used by administration. Y% of the computers are used by students and academic staff. Almost all staff in the Faculty of Agriculture have access to a computer.	
Computer Access - Students	Generally access to computers by students is low. The Faculty of Agriculture has 150 computers assigned to approximately 1000 students.	Access varies. Science students have more access than students from the Arts faculties.
Specification of Computers	The computer specifications are a mixture of old and new.	
Internet Connectivity	20Mbps/5Mbps bandwidth available. This is funded through donor funds.	Two links through the Local telco terrestrial fiber networks (these telcos access via satellite) One link through VSAT to intelsat
Bandwidth Management	Network monitoring and bandwidth management is done – certain downloads, chat, etc are prohibited.	At finalization of this reports DICTS was still to confirm.
Network Infrastructure	All buildings are part of the university optical fibre backbone. Network project is part of the 2005-2009 project and its 70% complete. The network topology is MAK has deployed wireless connectivity in certain areas of the campus	Confirmation of network topology by DICTS.
Network Security	MAK has a linux-based firewall. A centralized anti-virus management system called SOPHOS is used. There is no windows system update server.	
Email Communication	The MAK email system is web-enabled and available to both students and staff. However, it is very unpopular with students - Used by 30% of university community – mainly staff.	Email system is based on Linux (Posffix/Mysql).
Software Licensing	MAK is struggling to fund windows licenses adequately.	
University Website	MAK has a website that provides valuable information. www.makerere.ac.ug	
Computer Literacy Training - Staff	No planned mandatory training. Training has been organized in the past and is till being organized but there is no policy that makes it mandatory.	
Computer Literacy Training – Students	Most courses have a mandatory first year ICT course. However, implementation may currently be among 40% of the academic programs.	Still to verify if there is mandatory ICT Literacy training for students on the curriculum.

<i>Area of Focus</i>	<i>Findings</i>	<i>Comments/Recommendations</i>
E-literacy - Staff	Generally staff e-literacy is continuing to grow. A one-off end-user skills training course was run for 3 years. No continuing training has happened since. There is no institutional structures to assure this.	
Other E-learning initiatives	The Center for Distance and Adult Education has been a part of the African Virtual Initiative since its inception. Faculties have also been engaged in other initiatives, e.g. a student in the Faculty of Agriculture studying using e-learning with the University of Florida. As way back as 2000 staff were trained in e-learning platforms such as Blackboard. Currently there are various e-learning platforms used at Makerere. The Faculty of Computing and Information Technology has uploaded a number of its courses.	Need to rationalize and have one e-learning platform for MAK
E-learning equipment	Did not visit the e-learning unit. Was informed that the unit has one E-learning Administrator and 2 E-learning Servers. There is a content lab with 15 PCs and scanners, cameras, etc. Whiteboards in Six faculty labs.	The E-learning Unit has one member of staff – the administrator. The unit currently has no home and has been housed in the DVCs office.
Technology Fees	Students currently do not pay Technology Fees. The modalities of this fee are being worked out. The Student Union supports this fee.	
Change Management & the environment	The support for ICTs and change in the teaching methods exists in the highest governing body. Lecturers appreciate the benefits of ICTs in the delivery process.	
Tour of facilities	MAK has fairly good teaching facilities. However the student numbers do not match the space available. Teaching rooms and theaters don't all have network points, no white-boards in most rooms and no mounted LCDs in most teaching rooms and there are no instructor workstations for teaching & learning.	Based on the Faculty of Agriculture facilities tour.

Directorate of Information and Communication Technology Systems (DICTS)

The Directorate for ICT Support (DICTS) oversees the implementation of the ICT Masterplan. It also handles all central services (e.g. email, web, Internet access).

Distance Education and Institute of Adult & Continuing Education

The DEIACE has been involved with African Virtual University since the inception of the AVU project. This unit has valuable documented lessons from this initiative. Some of these are:

1. Lack of access to computers and slow Internet connectivity have hampered the e-learning initiative.
2. The non-recognition of the development of electronic content for promotion purposes was a major de-motivating factor.

General and Other Recommendations

1. Makerere University is a huge institution. The focused implementation of the e-learning project will require an extensive awareness program, the setting up of an enabling e-learning policy environment, commitment of sizable resources and continued support from the University Council and the Government of Uganda. The fact that e-learning initiatives began in 1999 but to date the e-learning function is not adequately positioned in the Makerere University organizational structure is a cause for concern. Lack of clear policy has also resulted in the mushrooming of various e-learning platforms. It seems the availability of project funds is what motivated these initiatives and not a deliberate strategy by the university.
2. There is an E-learning Unit at Makerere but it is inadequately staffed with only one member of staff (E-learning Administrator).
3. Academic Staff that were trained around year 2000 in the use of Blackboard say: "I did not know why I was being trained? The justification was not adequately communicated. Even though I got an e-learning certificate I did not use the knowledge. This was because access to computers was lacking and the infrastructure at Makerere was still being set up when we were undergoing training. In addition less than 20% of the staff were trained at that time and students lacked ICT skills because of their academic backgrounds".
4. The lessons learned from the current initiatives need to be evaluated so that they can be turned into positive experiences to move the initiative ahead.
5. The bandwidth at Makerere University is donor funded. This is risky because when the donor funds come to an end the system will suffer. It is recommended that a portion of the bandwidth be funded from the university mainstream budget.

Proposed Implementation Strategy

The e-learning project has four phases – technical, administrative, curriculum and academic support. It is recommended that the implementation strategy for the RUFORUM institutions encompass these four phases.

1. TECHNICAL PHASE

This is the most critical and costly phase. It involves the analysis of the adequacy of the following: Network Infrastructure; Network Security; Internet Connectivity, Bandwidth Management; Servers; Learning Management System and Content Management System; Software licensing issues; Access to computers; e-learning equipment and dedicated Technical Support (ICT Department).

The findings are documented and a Technical Plan drawn up. A Budget for the gaps is drawn up – then financial resources are sought for the implementation of the Technical Plan.

2. ADMINISTRATIVE PHASE

The administrative phase involves the analysis of the adequacy of the following:

- Support for the project from the Chief Executive's Office (Vice Chancellor or Rector)
- E-learning Vision for the College/University
- E-learning Committee, E-learning Policies, E-learning Plan, ICT Strategic Plan & Policies, College/University Strategic Plan
- E-learning Support Unit in the College structure
- Marketing and Promotion of the project.

The findings are documented, a plan of action is drawn up. A budget is drawn up and financial & human resources are identified.

3. CURRICULUM PHASE

This phase involves decisions on what courses to offer initially. ***QUALITY VERSUS QUANTITY*** is the motto. A blended approach to e-learning is recommended – i.e. combine one of the ICT enabled methods of delivery with face to face approach.

This phase also looks into the critical aspect of electronic content development or conversion of paper based content to e-content. Questions such as these are answered:

- Is the development of content going to be contracted to external content developers/reviewers?
- Or is it going to be developed by Academic Staff?
- If staff do it who is going to own it – them or the university?
- If the university will own it will staff be paid to cede their rights to the content that they developed?

Even if staff is going to do the development there is a need to appoint one or two Instructional Designer(s)/Content Developer(s).

The phase also looks into the adequacy of the curriculum to produce ICT-proficient graduates.

4. ACADEMIC SUPPORT

This is a critical phase and it addresses issues such as:

- ongoing re-tooling/training of academic faculty
- ready technical support in the case of problems with the e-learning system
- resources for e-learning – both learners and facilitators

Conclusion

It is evident from this analysis that the universities that were visited are aware of the potential benefits of e-learning. However what is clearly lacking is a coordinated approach to implementing e-learning. The existing e-learning initiatives were mostly driven by the availability of specific project funds in specific departments in the universities. These initiatives are not a result of a deliberate strategy by the universities to implement e-learning. This has resulted in lack of technical infrastructure planning, lack of supportive policy frameworks, lack of strategic plans that encompass e-learning and lack on-going and policy-driven re-tooling of academic staff.

Other issues of concern are the critically low student to computer ratios, the lack of ready local electronic content, non representation of the e-learning function in the university organisational structures, the lack of inclusion of ICT expenditures in the mainstream budgets – among several issues.

The success of the e-learning implementation within the RUFORUM institutions hinges on a commitment to addressing all the issues covered in the proposed four phases of the project – technical, administrative, curriculum and academic support. It also hinges on continued support from the Vice Chancellors/Rectors.