



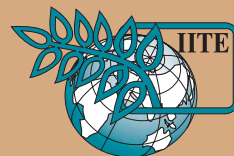
UNITED NATIONS EDUCATIONAL,  
SCIENTIFIC AND CULTURAL ORGANIZATION

# **INFORMATION AND COMMUNICATION TECHNOLOGIES USAGE IN HIGHER DISTANCE EDUCATION IN SUB-SAHARAN AFRICA**

**National and regional state-of-the-art and perspectives**

Botswana  
Ethiopia  
Ghana  
Kenya  
Mauritius  
Namibia  
Seychelles  
South Africa  
Swaziland  
United Republic  
of Tanzania  
Uganda  
Zambia  
Zimbabwe

UNESCO INSTITUTE  
FOR INFORMATION TECHNOLOGIES IN EDUCATION



MOSCOW 2004



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MOSCOW 2004

**UNESCO**  
**UNESCO Institute for Information Technologies in Education (IITE)**

IITE editorial coordination:  
Yuri Zaporovanny

**Information and Communication Technologies Usage in Higher Distance Education in Sub-Saharan Africa:**  
National and regional state-of-the-art and perspectives

In 2002 the UNESCO Institute for Information Technologies in Education submitted on the extrabudgetary funding for the programme *Capacity Building for Education for All* the project *Information and Communication Technologies for Higher Distance Education (HDE) in Sub-Saharan Africa (SSA)*. The project was approved by UNESCO Headquarters, and in 2003 IITE provided under the same name the training session for English-speaking participants from countries in Africa.

Participants of the training session – highly qualified specialists from 11 SSA countries, namely, Botswana, Ethiopia, Ghana, Kenya, Mauritius, Namibia, Seychelles, South Africa, Swaziland, Tanzania and Uganda, and two representatives from UNESCO International Institute for Capacity Building in Africa (IICBA) took part in the project.

The representatives of each country prepared the projects (business plans) on the ICT implementation in DE in their home countries and did other research work.

Some of these works are presented in this publication.

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## Preface

By December 2003 UNESCO Institute for Information Technologies in Education (IITE) completed all actions and activities on the project *Information and Communication Technologies (ICTs) for Higher Distance Education Usage in Sub-Saharan Africa*, including the core event – training session consisting of three stages: 1) face-to-face training seminar (five days) – 14-19 October 2003; 2) online training session (seven weeks); 3) face-to-face training seminar (five days) – 8-14 December 2003.

19 participants from 11 SSA countries, namely Botswana, Ethiopia, Ghana, Kenya, Mauritius, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Uganda and the International Institute for Capacity-Building in Africa (IICBA) took part in the project.

Training session was the final step in the long-term IITE project in the sphere of ICT usage in distance education. The main stages of this activity were:

- expert meeting *Distance Education: Structure, Methodology, Staff Development and Legal Aspects* (IITE, Moscow, March, 2000);
- expert meeting *Distance Higher Education in Africa: Professional and Course Development* and workshop *ICTs in Distance Education* (Dar-es-Salaam, Tanzania, September, 2001);
- seminar for high-level experts *Policy Formulation and Practical Usage of ICTs for Higher Distance Education in Countries in Africa* (Nairobi, Kenya, October-November, 2002);
- training session *Information and Communication Technologies (ICTs) for Higher Distance Education Usage in Sub-Saharan Africa* (Pretoria, South Africa, October-December, 2003).

At different stades of the IITE project there were involved **21 countries**, namely, Australia, Botswana, Canada, Ghana, Ethiopia, India, Israel, Italy, Kenya, Mauritius, Namibia, New Zealand, South Africa, Russian Federation, Seychelles, Swaziland, Tanzania, Uganda, United Kingdom, USA, Zambia and representatives from UNESCO Regional Bureau for Education in Africa (BREDA) and UNESCO IICBA.

More than **130** highly qualified specialists, experts, observers, moderators, facilitators and organizers took part in these activities. In this connection special thanks of IITE may be addressed to Dr Nicholas C. Farnes (United Kingdom), Prof. Michael G. Moore (USA), Prof. Wayne Grant Mackintosh (New Zealand), Prof. Satoki T. Mahenge (Tanzania), Prof. Vagan Shakhgildyan (Russian Federation), Dr Honoratha Mushi (Tanzania), Prof. George S. Eshiwani (Kenya), Prof. Olive M. Mugenda (Kenya), Dr Robert Stephen Day (South Africa), Dr Linda Black (USA), Ms Evelyn Nonyongo (South Africa).

In this publication you will find the works devoted to ICT usage in different regions of Africa, state-of-the-art of ICT usage in higher distance education in some countries of Sub-Saharan Africa and some projects (solutions) on the application of ICTs in national distance education (DE) strategies.

We hope that publication of these materials will be useful for some analyses and perspectives for implementation of ICTs in distance education in countries of Sub-Saharan Africa.

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**Vladimir Kinelev**  
Director  
UNESCO Institute for Information Technologies in Education (IITE)

## **IITE Activities in Africa**

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The UNESCO Institute for Information Technologies in Education (IITE) started collaborating with the countries in Africa in 1999, when a number of National Commissions for UNESCO established national focal points for cooperation with IITE, namely, Cape Verde, Ghana, Namibia, Senegal, Seychelles and Tanzania. The Institute successively developed cooperation with the countries of Africa within the framework of its project *Information and Communication Technologies (ICTs) in Distance Education*.

According to the IITE Statutes one of its priority areas of activities is distance education. Practically, the project *ICTs in Distance Education* was launched at the meeting of experts *Distance Education: Structure, Methodology, Staff Development and Legal Aspects* (IITE, Moscow, March 2000), where the experts from seven countries were present, namely, from Australia, Canada, Israel, Italy, Russian Federation, Tanzania and United Kingdom.



IITE, Moscow, 2000

The decision of the General Conference of UNESCO (30 C/5, par. 01443) identified the objectives of the meeting: for the period 2000 and 2001 the UNESCO Institute for Information Technologies in Education should concentrate its attention particularly on launching the international project *ICTs in Education: State-of-the-Art, Needs and Perspectives* as well as on a set of training and self-training modules to be prepared and tested for various categories of educational personnel. At the meeting the experts were to observe the practical usage of ICTs in distance education, examine existing models of distance education based on ICTs, review examples of educational programmes and application of ICTs for distance education staff training, make recommendations on main trends of the IITE activities and international cooperation in the field.

Being interested in closer cooperation with the countries in Africa IITE held the expert meeting *Distance Higher Education in Africa: Professional and Course Development* and workshop *ICTs in Distance Education*, 20–21 September 2001.



Following the invitation of UNESCO National Commission of the United Republic of Tanzania, these events were located on the premises of Open University of Tanzania, Institute of Educational Technology (Dar-es-Salaam, Tanzania).

About 60 participants and observers from eight countries – Israel (by correspondence), India (by correspondence), Kenya, Namibia, South Africa, Tanzania, Zambia, United Kingdom and USA – attended the expert meeting and workshop.



Dar-es-Salaam, Tanzania, 2001

The main goals of the expert meeting were to discuss the professional development of distance education in African higher institutions and to consider courses and teaching/training materials for distance education staff training. The central themes of the discussion were the prospective approaches to capacity building in distance education for higher school of the countries in Africa and possible joint activities of UNESCO IITE and UNESCO Member States in Africa to foster ICT applications in education, especially in the personnel training and course development for distance education. The participants of the expert meeting studied the international experience of ICT usage in distance learning, particularly, in the universities in Africa, discussed the issues related to the educational programmes and application of ICTs in staff training for distance education, reviewed the examples of courses developed for distance learning, discussed the role of international cooperation in building the national capacities for higher education in Africa.

The participants of the expert meeting stressed that the capacity building initiatives on ICTs and distance education should be instituted through corresponding strategies to ensure access and sustainability of human development. The expert group recommended that higher education institutes in Africa should be supported in their efforts regarding the development of teaching/learning resources for distance education and open learning.



Dar-es-Salaam, Tanzania, 2001

The expert meeting reconstituted itself into a workshop to provide comments and suggestions on the specialized IITE Course *ICTs in Distance Education* which was elaborated by the international working team set up by IITE and headed by Prof. Michael Moore (Penn. State University, USA).

Developing educational programme to be used in training activities at the Institute and beyond, IITE has chosen a modular structure for it, as the most matching the required flexibility and the needs of different users and various target groups.

The specialized IITE course *ICTs in Distance Education* was prepared for policy-makers in education, both pre- and in-service teacher trainers, trainers in vocational institutions, instructors and schoolteachers.

The course embraces the following parts as a basis for training activities:

- concept of distance education, its history and the special place of ICTs in this particular educational context;
- principal organizational contexts and representative economic/social contexts under which ICTs are used in distance education with illustrative case studies;
- system and course design procedures in distance education using ICTs;
- teaching principles and procedures in using ICTs;
- what is known about learning and learners using ICTs in distance education;
- principal policy issues at institutional and national levels.

At the beginning of the workshop Prof. Vladimir Kinelev, Director of IITE, introduced the background of IITE training activities in the field of distance education, after which the specialized course module *Information and Communication Technologies in Distance Education* was video-presented by the head of the international editorial team Prof. M. G. Moore. The specialized course module introduced, Dr Honoratha Mushi, member of the international editorial team, presented the course, module by module, and the participants made valuable comments and suggestions.

The workshop *ICTs in Distance Education* resulted in the following conclusions:

- to adapt the presented course for distance education in African higher school and later use it to train staff for distance education;
- to enrich the course with good practice examples of ICT application in distance education;
- to supply the users of the course with current update on hardware and software resources required for its implementation;
- to consider possible implementation of the course in a classroom course (e.g. 32-hour) and a e-learning course, and to prepare two relevant versions of the last;
- to organize pilot distance learning course;
- to publish an improved version of the specialized IITE course and to disseminate it among Member States.

In response to the request, IITE formed the international team headed by Prof. M. Moore and Prof.



Nairobi, Kenya, 2002

Wayne Mackintosh, who adapted this course to be used in the countries in Africa.

The results of this work were presented at the seminar for high-level experts *Policy Formulation and Practical Usage of ICTs for Higher Distance Education in Countries in Africa* held in Nairobi, Kenya, from 29 October to 1 November 2002.

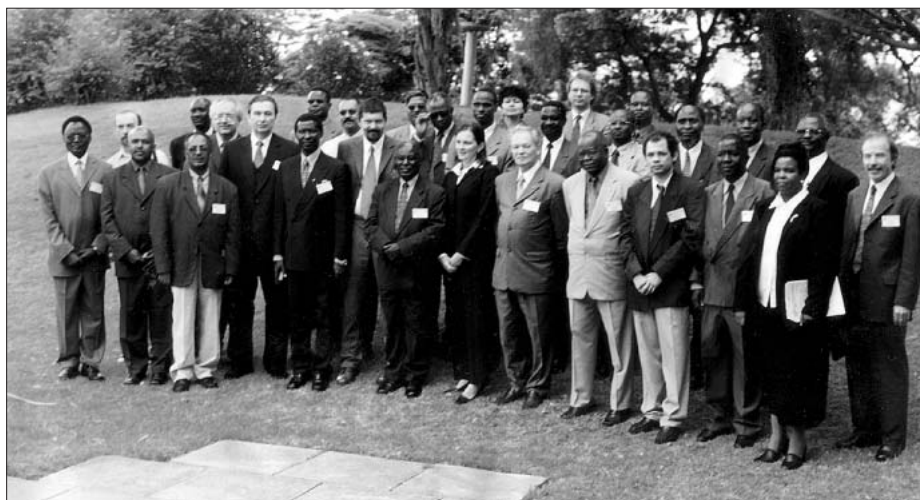


Prof. Mackintosh is presenting IITE specialized training course. Kenya, 2002

The main goal of the seminar was to identify the ways and modes of policy formulation and practical usage of ICTs in higher distance education in the countries of Africa.

The participants from seven countries, namely, Ghana, Kenya, Namibia, Seychelles, South Africa, Uganda and Tanzania as well as the representatives of four national focal points for cooperation with IITE, UNESCO Regional Bureau for Education in Africa (BRED), UNESCO International Institute for Capacity Building in Africa (IICBA), World Bank Group (IFC), US International University, Centre for Flexible and Distance Learning, University of Auckland (New Zealand), and African Study Centre met to share their experience at the seminar.





Nairobi, Kenya, 2002

They surveyed the international experience of ICT usage in distance learning, particularly, in the universities of Africa, discussed issues related to the application of ICTs to train staff for distance education, as well as the role of international cooperation to develop national capacities for higher education in Africa.

In conclusion the following recommendations were made:

1. IITE in cooperation with BRENDA, IICBA and in close partnership with UNESCO Member States should come together to initiate a proposal for a sub-regional project on ICT applications in distance education in SSA countries.
2. IITE should draft a project plan to implement a pilot course for training future trainers in ICTs for distance education using the IITE specialized training course *Information and Communication Technologies in Distance Education*.

Following these recommendations IITE has prepared and submitted the project *Information and Communication Technologies (ICTs) for Higher Distance Education Usage in Sub-Saharan Africa (SSA)* to the Headquarters of UNESCO for extrabudgetary finance within the framework of the UNESCO extrabudgetary programme for technical services to Member States *Capacity Building for Education for All (EFA)*.

The proposed project on ICT usage in higher distance education (HDE) in the SSA countries had the following main objectives:

- a) to assist UNESCO Member States in the SSA countries in integration and application of information and communication technologies in HDE;
- b) to share information and materials at the disposal of IITE related to the problem with the SSA countries;
- c) to elaborate plans on training and retraining of educational personnel on ICT usage in HDE in the SSA countries;
- d) to develop a network for training and retraining of educational personnel on ICT usage in HDE in the SSA countries;
- e) to contribute to the reinforcement and multiplication of training capacities in the crucial related areas;
- f) to provide a pilot course to train future trainers in ICTs for distance education in the countries in Africa using IITE specialized training course *ICTs in Distance Education*.

The project assumed the elaboration of guidelines to train specialists in ICT usage in HDE in the SSA countries, develop and disseminate training materials and network to train and retrain educational personnel on ICT usage in HDE in the SSA countries, organize and provide intensive training sessions for the participants from the SSA countries (2 one-week sessions for 20 participants) on the base of the IITE specialized training course *ICTs in Distance Education*.

On a competitive basis the group of UNESCO experts approved the project with total financing of US \$197,000.

After the project was approved, IITE started its implementation.

The detailed plan was elaborated envisaging:

- search of the appropriate place for the training sessions;
- selection of the countries and participants;
- choice of experts and moderators to host training sessions, and signing the contracts with them;
- preparation of necessary training materials;
- transformation of the specialized IITE course to the distance form;
- development of appropriate distance education platform for online part of the training sessions.

The project *Information and Communication Technologies (ICTs) for Higher Distance Education Usage in Sub-Saharan Africa (SSA)* was accomplished by IITE in close cooperation with the Pennsylvania State University (USA) and University of South Africa (UNISA).

By 25 December 2003 the UNESCO Institute for Information Technologies in Education (IITE) had completed all actions and activities on the project, including the core event – successfully carried out training session consisting of three stages: 1) face-to-face training seminar (five days) – 14–19 October 2003; 2) online training session (7 weeks); 3) face-to-face training seminar (five days) – 8–14 December 2003.

The face-to-face training seminars were held at the Institute for Continuing Education, University of South Africa (UNISA), Pretoria.

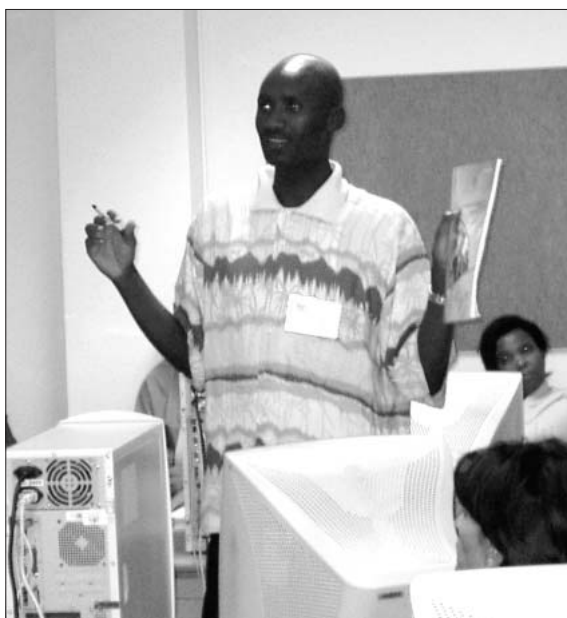


UNISA, Pretoria, 2003

Participants of the training session – 25 educators from 14 countries (11 from Sub-Saharan Africa) – watched the Geneva discussion at the round table *Education and Knowledge Societies*, one of the UNESCO events at the World Summit on the Information Society (WSIS) organized by IITE. The round table was accessible in the Internet through streaming broadcast from the IITE web site. The participants of the training session asked questions by phone and received answers through the Internet.

The successful outcomes of the training session were achieved thanks to the joint active collaboration of IITE and leading experts in the field of ICTs for DE – academicians, methodologists, and ICT specialists – from four continents.

Main results obtained via the project implementation are the following:



1. IITE has trained 17 highly qualified specialists from 11 SSA countries, namely, Botswana, Ethiopia, Ghana, Kenya, Mauritius, Namibia, Seychelles, South Africa, Swaziland, Tanzania and Uganda, and two representatives from UNESCO International Institute for Capacity Building in Africa (IICBA). Among the participants were two Deputy Vice-Chancellors from Kenyatta University (Kenya); Secretary to the Executive Committee of Uganda National Association for Distance and Open Learning (UNADOL) (Uganda); the National Coordinator of the Science Resource Centers of the Ghana Education Service (Ghana); Director of the Institute for Education Development and Extension (IEDE) (Ghana); Electronic Database Specialist of the Inter-University Council for East Africa (Uganda); Director of Institute of Educational Technology in the Open University of Tanzania (Tanzania); Assistant Director for Studies of the National Institute of Education (Seychelles) and others.

**First training seminar. Computer laboratory**

2. IITE has developed methodological basis for training sessions:
  - specialized training course *ICTs in Distance Education* elaborated by the IITE international team of experts. It was adapted to the needs of SSA countries and transferred in the format for distance usage. The course covers main problems, issues and teaching principles with special attention to ICT application, system at large, programme and course procedures of ICT usage, special needs of learners and corresponding implications for ICTs in distance education (DE) and principal aspects of policy-making at institutional and national levels;
  - instruction guide and guidelines for trainers of trainers on ICT usage in higher distance education in the SSA countries;
  - CD-ROM *Information and Communication Technologies in Distance Education. Readings*. Readings are the excerpts from publications for deeper comprehension of the specialized IITE training course.
  
3. IITE has developed the technological basis for training sessions and further development of regional and sub-regional network for DE:
  - WWW distance education platform (DEP) operating network for training and retraining of educational personnel on ICT usage in HDE in the SSA countries.
  
4. IITE has elaborated the underlying principles to develop further the regional and sub-regional network based on DEP, which could be the ground for future regional and sub-regional network of DE, to establish an International Virtual Institute with participation of the represented countries and IITE.
  
5. In the course of the project preparation and implementation IITE encountered several problems. To solve them it was necessary:
  - to select a group of highly qualified representatives of the SSA countries who would be able after the training session to train and retrain specialists in the sphere of ICT usage in DE in their countries;
  - to form the group of international experts and moderators – distinguished specialists of ICT usage in DE in the SSA countries;





Second training seminar. Work in groups

- to adapt the IITE specialized training course *ICTs in Distance Education* to the needs of the DE system in the SSA countries;
- to prepare necessary methodological and practical guides and materials which would match the outcomes of the project;
- to elaborate the requirements for analysis, and terms of reference as a basis for the WWW distance education platform. According to the terms of reference it was necessary to provide the evaluation of alternatives. Several existing solutions, such as Learning Space by Lotus Software IBM Software Group, WebCT by WebCT, Inc., Blackboard by Blackboard Inc., FirstClass by FirstClass Division of Open Text Corp., Hypermethod by HyperMethod Co., Prometeus by Prometeus Co. software packages were analyzed. As a result, the IITE WWW distance education platform was created as the most useful environment to be implemented in the SSA countries;



Second training seminar

- to develop and test the software for DEP;
- to adapt the IITE specialized training course for distance form usage;

- to transfer the IITE specialized training course content into the DEP;
- to solve numerous organizational problems concerning the training session on the basis of UNISA; to maintain contacts with National Commissions for UNESCO and Ministries of Education of 13 SSA countries and candidates for participation;
- to design and produce the CD-ROM *Information and Communication Technologies in Distance Education. Readings*;
- to implement comprehensive technical and contextual support for the DEP to be used at two face-to-face sessions and in online activities, including the stable DEP – Internet connection via the IITE specialized server;
- to prepare subject outlines and timetables for face-to-face training seminars and home assignments for the interim period.

The training session pursued its objectives through mastery of the IITE specialized training course *ICTs in Distance Education* in the context of the state-of-the-art distance education and ICT application in the SSA countries as well as of the overview of the IITE-elaborated DEP for the training session.

The trainees worked individually and in groups accomplishing the following activities under the guidance of moderators: study of learning materials and articles, exchange of messages on the main issues of distance education, fulfillment of tasks (in the classroom and at home), face-to-face debates, further discussion of the main issues of the application of ICTs in distance education in open online forums, work with distance information sources in the web library. Group activities and plenary discussions helped the representatives interact and learn from each other.

Main objectives achieved:

- capacity building of the participants from the SSA countries and representatives from IICBA has been raised to the level enabling their future work in training of national specialists in the sphere of ICT application in HDE;
- methodological basis for future training and retraining of educational personnel on ICT usage in HDE in the SSA countries has been created;
- technological basis to develop further the network for training and retraining of educational personnel on ICT usage in HDE in the SSA English-speaking countries on the basis of the IITE WWW distance education platform has been developed;



**The presentation of certificates**

- national institutional capacities in EFA planning and implementation in such areas as teacher training and appropriate use of ICTs in DE in SSA countries have been strengthened. The representatives of each country prepared the projects (business plans) on the ICTs implementation in DE in their home countries. The similar projects were accomplished for three SSA sub-regions: Central and Eastern SSA countries, South African countries and Island States.

The participants (trainees and moderators) highly evaluated the methodological materials, WWW DEP developed by IITE, and the training session as a whole. Most of the trainees stressed that the experience of DEP usage essentially improved their skills of online teaching/learning and computing in general. They noted that the DEP reliable operation, its didactical features, embedded communication tools and training resources allowed to shape the virtual learning community of DE professionals in the SSA region.

Below we provided assessments of moderators and participants of the project.



## Moderators

### Prof. Wayne Mackintosh, leading facilitator



Director,  
Centre for Flexible and Distance Learning.  
The University of Auckland,  
Auckland, New Zealand.

I'm happy to be working on this important IITE initiative. I must compliment IITE for following through on their support for ICTs and DE in SSA.

We are creating history in South Africa.

### Dr Robert Day, moderator



Consultant, *ICTs for African Development*

It was very encouraging to see the positive response of delegates from all over Africa in our recent IITE workshop to the advanced concepts on open distance learning (ODL) and the resultant optimal application of ICTs that Wayne and I described, and that IITE's ICT tools excellently supported. A few years ago such a response would not have been likely – some quality thinking appears to have been going on across Africa by people who genuinely understand the needs, especially of the most disadvantaged people. It seems the time has now come for us to have REAL impact!

Wayne and I agree that it is a very exciting prospect of working with all of you – committed, knowledgeable components of UNESCO – to advance these holistic ICTs in ODL strategy across Africa, with Africans, for Education for All in Africa!

### Dr Linda Black, moderator



Pennsylvania State University World Campus,  
Founding Director, Computer Learning Center,  
Navy Information Systems Activity

What a positive-spirited team! Thanks for all that you have done (and continue to do) to make this particular UNESCO Project happen.

I hope that your (participants) achievement may be a stepping stone to the formulation of policy and the practical usage of information and communication technologies (ICTs) within higher education in your home countries.

From 14 October to 12 December 2003 you have diligently worked to complete the three parts of the pilot project. You have participated in two face-to-face workshops held at UNISA, Pretoria, and you have completed (during the three-month period) a hefty range of online activities.

What an incredibly wonderful result you have achieved! One hundred percent of you have crossed the finish line.

We believe in you! We have heard your visions, ideas, and plans. We have seen your skills. We have felt your energies. We believe you are up to meeting the tremendous challenges posed by the possibilities for policy formulation and practical usage of ICTs in higher education in Africa.

IITE's mission is to "strengthen the national capacities of UNESCO Member States for applying ICTs in education." We trust you will meet the challenge of carrying out that mission.

## Participants of the project

### Dr Habtamu Zewdie (IICBA)



The course *Information and Communication Technologies in Distance Education* organized by IITE and UNISA has given me a wonderful opportunity to reinforce my experience in distance education with theoretical basics.

In particular, I have gained good knowledge of how to implement ICTs in education, and understanding of the fundamental issues to influence distance education policy in my country.

### Ms Rholene Bok (Namibia)



This course has proved that distance education is the education for the future. It keeps up with the global trends in education, and using ICTs in DE is the way to meet the demands of *Education For All* programme to alleviate poverty in the world. I am privileged to be part of such dynamic course and group. The course was structured and presented well, one of the best that I have ever done, and I have done many courses in my life.

Altogether, this course is highly relevant and timely. You know, I have learnt about the DE dynamics, and how to ride on the wave of its changes. The course is a must, especially, for professional DE practitioners to ensure the quality delivery of material in any of the many chosen modes. Thank you, IITE.

**Dr Theophilus Aquinas Ossei-Anto (Ghana)**



Going through this course has been one of the best things that ever happened to me.

My ideas of the systems, operations, mechanisms, concepts, and generations of DE have been nourished very much.

In addition, I have been exposed to the fundamental principles behind the integration of both existing and emerging ICTs into DE.

I can confidently say that I have acquired new skills, and I am now in a much better and refined position to carry out DE operations in Ghana – irrespective of whether my services are needed locally or nationally.

I have also encountered DE colleagues and experts, who I can either collaborate with or fall upon for advice.

I can hardly thank IITE enough for the unique, wonderful and life-long learning experience.

**Mr Alex Souffe (Seychelles)**



Honestly, the IITE course has simultaneously enhanced my knowledge in distance education and computer skills pertaining to online courses, and the potential of digital ICTs in DE. It has also provided me with sufficient technical know-how of compiling a business plan.

Furthermore, it has enabled the establishment of a ‘true collegial and supportive group’ whom I feel at ease to seek for assistance or advice in any areas of their expertise. It has, undoubtedly, created the means for us to support each other on the African continent. Now it is up to us to keep this network active. Thanks to everyone.

**Mr Geoffrey N. Shakwa (Namibia)**



The cutting-edge, contemporary, thought-provoking and, yet, very informative course on ICTs and distance education. The most significant parts where I have gained tremendously were the theoretical issues of distance education and the variety of ICTs that are relevant in the delivery of DE. Further, through this course, I have established contacts that, otherwise, would not have been possible with practitioners and researchers alike in Sub-Saharan Africa and the world over, who are passionate about making the access to education a reality to all people on this planet. It has been such a wonderful experience for me!

**Prof. Roshun Dhurbarrylall (Mauritius)**

The objectives were attained in record time, bearing in mind the amount of material covered.

Online delivery of DE was unknown to me before. I can now appreciate what it is and understand the implications. I have gained a lot from this online experience.

This will assist the MCA (Mauritius College of the Air) to proceed with its online projects.

The facilitators were very accommodating and willing to share their experience and knowledge with us. We all have benefited.

**Mr Sam Siminyu (Uganda)**

I started the course with a lot of skepticism over whether it was appropriate to even initiate the discussion of ICTs in DE on a continent like Africa. The course gave me an opportunity to think it all over again. By the end of the course, I am convinced that if Africa has to forge ahead in development, ICTs are a key, and more so for DE.

The course has afforded me the opportunity to reflect on the experiences of other players in the global field of DE and to build networks, which I believe will prove invaluable in my future contributions, in whatever way, to bridge the learning divide via ICTs. The experience was worthwhile. The course objectives were covered fairly well. The presentation of theoretical content was well done both in the face-to-face mode, on CD-ROM (Readings) and online. If only more time were available, this is an excellent course design.

**Mr Emmanuel Atta Gyamera (Ghana)**

The course objectives, I am sure, have been achieved. The course has exposed me so much as far as the organization of DE programmes is concerned. It includes various definitions of DE, delivery modes, applications of ICT in the DE organization or delivery, and the advantages that my country will derive making use of DE compared to the conventional face-to-face delivery.

The problems associated with DE and how to overcome them have been addressed in this workshop. The online approach has exposed a lot of experiences in how to work online. On the whole, it is a very important course, that will help me build DE capacity in my country.

**Prof. Satoki T. Mahenge (Tanzania)**



At the entry point to this course I had no skills of online learning and scanty understanding of distance education.

However, I thank the course designers, moderators and IITE that at present I have the skills of online teaching/learning and better understanding of DE concept and process of delivery. I will be able to teach others in Tanzania particularly the online learning and wider understanding of DE.

**Dr C.W.S. Sukati (Swaziland)**



This was a well-planned and organized course, which was run by the facilitators who have passion for ICTs in distance education. A lot of work has gone into the planning and running of the course, and we are grateful to the facilitators.

The course should continue to be offered to other DE practitioners, so that DE can continue to develop and afford our brothers and sisters an opportunity to access tertiary education. Without providing Education For All, our countries will not develop.

I would, however, suggest that when it is offered next time, the full details on the course should be given to the participants and the organizations they come from, so that they can appraise the time requirements for the course.

**Prof. Olive N. Mugenda (Kenya)**



This is the most useful course I have undertaken in recent times. It was very informative, well-thought over, well-presented and professionally articulated. The facilitators were very knowledgeable and committed to their work. Having organized the Nairobi workshop where the course was recommended, it is my personal satisfaction that the recommendation was implemented, and I became one of the beneficiaries.

The course has given me the necessary skills to mount a similar course to my colleagues in my Institute. It has opened up new opportunities for me to undertake online courses with ease. I wish to thank IITE and the facilitators for the wonderful idea/work.

I think the course objectives were met specifically, as they are related to the concept of DE and the whole DE system, ICTs and how they can be applied, the teaching principles associated with DE, organizational and management issues and relevant logistics, the application of DE for learners with special needs and the policy-shaping in DE. The facilitators

used both the face-to-face and online activities to meet the course objectives. I plan to use the information gained to streamline some areas in the way DE is being handled in my institution.



**Prof. S. M. Rajab (Kenya)**

The course was extremely informative, I am truly delighted to have made the decision to come to Pretoria. What I learned in this course will definitely help me and my institution improve the quality of delivery of distance education. The impact the course will have in the delivery of distance education in Africa is guaranteed.

1. The concept of DE, its history and the role of ICTs in this form of education were well articulated both in the course modules and the assignments, which we did. I now have a better understanding of the concepts of distance and open learning.
2. The core functions of teaching and learning in DE and corresponding organizational, social and technological implications were adequately covered.
3. The overall DE system, including program and course design procedures using ICTs, were covered during the course. However, I believe more time needs to be allocated if this course is offered in future.
4. Teaching principles with special attention to ICTs were adequately addressed, and sufficient examples were given.
5. Special needs of learners and corresponding implications for ICTs in DE were covered well, adequate literature was provided. We had the opportunity to visit a facility at UNISA, which handles demands of learners with special needs.
6. Policy issues at institutional and national levels were fully presented.
7. The use of distance education platform for online activities was clearly introduced. I can now confidently surf the IITE platform.
8. We prepared a draft business plan to launch a similar course in our own country. I would like to thank the facilitators most profusely for assisting us in doing this.
9. I strongly believe that more time should have been availed, and a practical example given to demonstrate web delivery of DE.

**Ms Lindiwe Shabala (UNISA)**

This is a useful and relevant course for open distance learning (ODL) practitioners.

I particularly see it as very relevant to material developers (instructional designers), tutors and managers and/or leadership in distance education. In that sense I perceive it as an effective staff development tool. It provides with the online distance learner perspectives, which so many of us have yet to experience, although we are working in distance education.

**Mr Philip Ouma Ayoo (Uganda)**



The course was very heavy, both in content and activities.

The two face-to-face sessions were quite demanding not only for the students (who had to attend the forums, post threads on the discussions, submit assignments and also do the readings for the course), but also for the tutors (who had to deliver the content, set exercises and assignments, give evaluations, and guide the learners on the whole course).

This programme has laid a firm foundation in trying to achieve the overall objective of the course: “building capacity in ICTs for DE in countries in Africa”, as most participants are very confident in their ability to realize the process in their countries.

Generally, the course has achieved its main objectives. The theoretical and practical issues on DE were excellently explained with focused practical assignments to reinforce this; the role of ICTs in DE was revealed and emphasized; the need and feasibility of opening up DE to the marginalized and challenged groups using ICTs were examined; policy issues were studied at both institutional and national levels; and, what is most important, the participants were taken through a practical step-by-step session on how to structure various proposals to enable them implement this course in their respective countries.

Personally, I have enjoyed the training. I have learnt a lot, and am confident that, in spite of the many challenges ahead, the project is implemental.

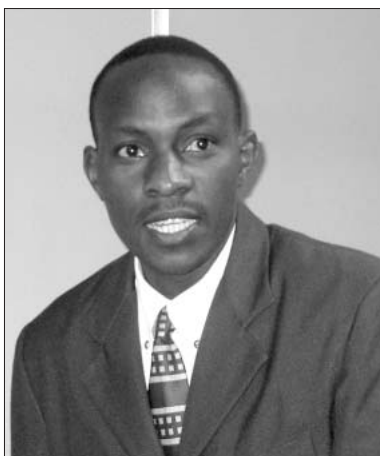
**Ms Fiona Ernesta-Uranie (Seychelles)**



The ITE course has been an eye opener and a journey into the practical realities of distance education in general and use of ICTs in distance education in particular.

It was not easy; in fact, it was very demanding and required personal commitment and self-discipline to some extent.

However, the formal course content blended with the practical realities of various countries and the input of the facilitators rendered this course commendable. The course is based on the use of ICTs in distance education, and I believe it achieved its overall aim. We learned by actually using various technologies and experiences of the countries. Facilitators have enabled us to avoid many of the pitfalls associated with use of ICTs in our future development of distance education courses and our choice of appropriate technologies. The online component was particularly interesting, and a range of skills was acquired in the process. It has been an enriching experience.

**Mr Benjamin Bussu (Tanzania)**

The course has been of great importance to me. I have understood well how to use the distance education platform for the online activities. I got well informed on the concept of distance education, its history and the role of ICTs in the form of education, as well as the core functions of teaching and learning in distance education, organizational, social and technological implications.

The overall DE system, including program and course design procedures using ICTs, has been well presented.

The objectives achieved, I feel very comfortable with how they were delivered and absorbed.

**Mr Eric L. Setabo (Botswana)**

Though quite demanding for a full-time employee, this course is a necessary tool for any ODL practitioner. It gives a holistic picture of what a successful ODL programme could and should entail. To start with, there is a lot of theory on ODL, which will benefit the newcomers in the world of ODL.

Then there is a comprehensive hands-on experience on how to work online. It gives the participants the theory of using ICTs in ODL alongside with practical experience on how one of the many ICTs can enhance learning.

It is apparent that time was short for most of the practical activities though. But all in all, the course has met all of its objectives.

This course has helped me realize that with critical and proper planning, it is possible for Africa to go into technology-enhanced DE.

**Ms Irine Chadibe (UNISA)**

It was a very interesting course, indeed. I enjoyed the face-to-face and group discussions, Forums, mostly. I think I have gained more knowledge about the types of ICTs in relation to different contexts.



**Mr Henok Workye (IICBA)**



It has been really great. The moderators were very resourceful and cooperative, UNISA was great in hosting the program. I'd say it was a successful workshop.  
Finally, thanks to everyone.

**Bob Day**  
ICTs for African Development  
*South Africa*

**Bob Jolliffe**  
Snr Lecturer, Dept Computer Science, UNISA  
*South Africa*

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## **PAN AFRICAN STUDY OF “E-CAMPUS”**

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## 1. Summary

This study for UNESCO of "e-campus" in Africa involved both study tours to a variety of higher education institutions (HEIs) in Senegal, Ghana, Ethiopia, Kenya, Uganda and South Africa, as well as desk-based investigations of Tanzania, Mozambique, Mauritius, Madagascar, Zimbabwe and South Africa. According to UNESCO:

*"The findings of the study will serve as a 'concept paper' to be widely disseminated and to feed into the work of an African Expert Group to be constituted to further develop and promote this concept."*

The report is divided into three main sections: first, overviews of relevant background information (chapters 2, 3 and 4); second, the study tour and desk based findings (chapters 5 and 6); and finally an analysis of the findings, and the resultant recommendations to UNESCO (chapters 7 and 8).

In chapter 2 the methodology of the study is briefly described. Then an overview is provided of the confusion caused by the term "e-campus" as reflected both by stakeholders in Africa, as well as by a variety of models found around the world. In light of this confusion, the following working definition of "e-campus" or "virtual campus" is proposed:

*"The leadership roles that HEIs should be playing, immediately and in the longer term, by employing information and communications technologies (ICTs) innovatively, efficiently and effectively to realize the goals of UNESCO's 'Education for All' initiative via a new tertiary paradigm, in 'open' partnership with each other, the public sector, the private sector, civil society, disadvantaged individuals and communities (urban and rural), and the international community."*

The last section of chapter 2 discusses the "new tertiary paradigm" as the context for understanding and prioritizing issues related to "e-campus", with major implications for the use of ICTs for both **educational access**, and **educational administrative systems**. However, the driving force of the paradigm is the creation of new, appropriate, **ICT-enhanced learning materials** for Africa.

Chapter 3 begins by briefly describing broad trends in tertiary education. Although, globally, there appears to be a philosophical shift from "class to mass", the growing imbalances between the global supply of tertiary education and the magnitude of the demand for access makes the imperative of providing a decent education for all one of the greatest moral challenges of our age. Meanwhile, most HEIs are attempting to do considerably more with a great deal less, particularly in Africa. A more detailed overview is then provided of trends in South Africa's tertiary sector, noting frustration with policy implementation, the growing emphasis on efficiency and effectiveness contrasted with the lack of emphasis on the need for a new tertiary paradigm, and the difficulties experienced with a range of collaborative initiatives. Finally, there is an analysis of current and future use and outputs of ICTs by HEIs in South Africa, structured in terms of teaching, administration, community service, and research.

Chapter 4 starts with a brief overview of trends in the global ICT sector. There is growing recognition of the widespread potential roles for ICTs in development, yet their penetration in Africa remains very low. NEPAD explicitly recognizes ICT as a key priority in Africa's development efforts, and identifies several areas for intensive ICT use, including some relevant to HEIs, e.g.: provision of training; use in research; and support of regional distance learning. South Africa's ICT sector is then described, noting that although it is the largest in Africa, it mostly constitutes outposts of the ICT multinationals rather than an indigenous industry. Most South African organizations are slow to adopt anything but the most basic applications. HEIs are perceived by the ICT industry to be failing to produce even 25% of the required numbers of ICT graduates, whilst those currently produced are not equipped with the appropriate types of skills to be useful to industry and society. The low levels of ICT innovation in most sectors is thought to reflect low levels of interaction between HEIs and the industry.

Chapter 5 reports the findings of brief visits to five African countries (Senegal, Ghana, Ethiopia, Kenya, and Uganda) to capture and assess (by interviews and workshops) the dominant **perceptions** held by a range of relevant and important stakeholders, their awareness and understanding of the issues, and their priorities. For each country, a brief overview of the tertiary sector is provided, followed by perceptions captured in the following

areas: “e-campus”-related national policy and strategy issues; ICTs and HEI administration (including institutional policy and strategy issues); ICTs and Access in HEIs (including Literacy issues); ICTs and new, indigenous Learning Materials; Collaboration; and Technology Innovations. In chapter 6 material is captured under the same categories from an Internet-based investigation of the major universities in other five African countries (Madagascar, Mauritius, Mozambique, Tanzania, and Zimbabwe). It proved difficult to construct realistic portraits in this way since the HEI web sites mostly provide superficial information of varying amount and quality from which one can only assemble hints on what may be happening within the organizations and countries.

Chapter 7 deals with the analysis of the extensive findings set out in the previous two chapters, with the intention of summarizing the prevailing perceptions regarding trends, concerns, and opportunities, as well as identifying interesting examples and strategic gaps. It is clear, and quite natural given the circumstances of most of the respondents that the majority of the inputs fall under the “efficiency and effectiveness” header. Most HEIs have shrinking resources, yet they are working in isolation on the same things. Donor-supported ICT projects involving African HEIs are seldom needs-driven and frequently reinforce the status quo in terms of concentration of inappropriate ICTs in urban centers, which do not contribute to the pressing needs of the remote and rural majority. Apparently, the history, cultures, and current circumstances of Africa’s HEIs make it very difficult for them to collaborate holistically in addressing even the “efficiency and effectiveness” issues, let alone in creating the new tertiary paradigm.

Finally, chapter 8 suggests a range of prioritized recommendations as a basis for UNESCO’s African “e-campus” policies and strategies. It emphasizes that “e-campus” needs to be driven as a major paradigm change beyond incremental efficiency and effectiveness measures. For clarity, some currently very common types of HEI ICT initiatives are identified which UNESCO should in future *avoid*. In conclusion, lists are presented of viable, coherent, nested short-and-longer-term recommendations at the continental, regional, national, provincial, organizational, community, and individual levels.

## 2. Introduction

Education systems around the world are experiencing a range of drivers for fundamental change, both from within and without. These include: globalization; changing concepts around the role of knowledge, knowledge workers, and knowledge citizens; the widespread need for quality, lifelong learning; and the relentless emergence of new information and communications technologies (ICTs), coupled with their growing penetration of, and impact on, all sectors of society, including the most disadvantaged. Understanding of the role of education has broadened significantly, recognizing that learners need to think independently and critically, and collaborate with others to make sense of their changing environment. In the developing world in general, and Africa in particular, the education systems are experiencing the greatest pressures, but have the poorest resources with which to respond. Yet few doubt that these education systems, and especially the tertiary sector, have fundamental roles to play in socio-economic development and poverty alleviation.

Over the past three decades, the convergence (both in terms of technology and markets) of telecommunications, the mass media, networked computing environments, and the Internet has changed the way the developed world works and plays. This ICT based “network society” is seen as the generator of a “new economy”, manifested in such icons as Silicon Valley and the Asian Tigers. However, almost all of these dramatic changes have been taking place in the developed world, whilst the developing world, and especially Africa, appears to be falling ever further behind. This “digital divide” will continue to widen as long as Africa is excluded from the network society and the new economy. Yet many believe that ICTs, appropriately employed, could be a driving factor in Africa’s development, inspired by such examples as Finland, which in four decades has risen from being one of Europe’s poorest countries to being one the world’s most innovative and technologically advanced economies with almost no poverty<sup>1</sup>. Is it possible to stimulate similar societal transformations throughout Africa?

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<sup>1</sup> The Information Society and the Welfare State: the Finnish Model; Manuel Castells & Pekka Himanen; Oxford University Press; 2002.

Africa has been importing developed world ICTs and employing them in a variety of ways for more than two decades, but with negligible impact on the exclusion and poverty of the vast majority of its people. Likewise, Africa's current education systems, mostly imposed by European colonial powers, have failed to satisfactorily address the basic needs of the masses, whilst the tertiary sector has mostly focussed on privileged elites. Can Africa's tertiary sector become the primary stimulant of the essential transformation of the continent's education systems required to kick-start systemic socio-economic development? Can Africa's higher education institutions (HEIs) lead the way in identifying the appropriate uses of ICTs to alleviate poverty and eradicate exclusion? Can Africa's HEIs strategically employ ICTs not only to improve their organizational efficiency and effectiveness, but also in the much broader context of the previous two questions? This study of "e-campus" in Africa intends to report on how HEIs are currently using ICTs for a variety of purposes. But it particularly hopes to provide UNESCO with guidelines for the development of a holistic strategy aimed at confronting the challenges and opportunities encompassed by the above three questions.

## 2.1. Methodology

This study of ICTs and the African tertiary sector (i.e. the development of "e-campus" or "virtual campuses" in Africa) is bi-level, involving both a study tour and a desk-based investigation. The study tour involved interviews and workshops with relevant specialists, practitioners and stakeholders in a range of African countries, including Senegal, Ghana, Ethiopia, Kenya, Uganda and South Africa (see Appendix A for full list of participants). The desk-based analysis of available information (primarily electronic, but including some hard copy) involved Tanzania, Mozambique, Mauritius, Madagascar, Zimbabwe and South Africa.

During the visits to each African country, the author interacted with and learned from local specialists, administrators, practitioners and stakeholders via interviews and workshops. The topics covered in such interactions included:

- Background information of institution/interviewee.
- How are ICTs managed? ICT executive structures, policies, and strategies.
- ICT literacy and the role of the tertiary sector – staff, students, and broader society.
- ICTs and administration, especially maintenance of what exists (infrastructure and systems) vs. creation of the future.
- ICTs and access, especially involvement with other national connectivity initiatives (e.g. SchoolNet).
- ICTs and new learning materials. What is the role of an ever growing range of ICTs, e.g.: print, fax, phone (including cell phones), the Internet, audiocassettes, radio, videocassettes, audio and/or video conferencing, TV, satellite, CD-ROM.
- Knowledge management in tertiary institutions (teaching and using).
- ICT-related collaboration at a range of levels: within and between institutions, provincial, national, and international.
- Special ICT challenges and opportunities, e.g. wireless, Open Source Software (OSS).

The interviews and workshops were set up to include as representative a range as possible of players from each country who are involved in ICTs in the tertiary sector (see Appendix A for workshop agenda and interview template). They were not only experienced in ICTs for such institutions, but also were enthused about the issues and the opportunities for future activities and collaboration. They included representatives from:

- Several tertiary institutions, using both contact and distance modes, and including public, private and international tertiary institutions.
- Students and learners.
- The national (and sometimes provincial) Ministry of Education, preferably specializing in ICTs for (higher) education.
- Influential NGOs involved in ICTs for education (e.g. SchoolNet, World Links, etc.).
- The local UNDP Country Office specialist on ICTs and/or education.
- The local UNESCO Office (where present).
- Any national connectivity initiatives.
- Local expertise in important emerging technologies, e.g. wireless, OSS.

The primary aim of each interview and workshop was to grow the mutual understanding of all the above issues. Some of these issues are of a generic nature, whilst others differ substantially from one country to the next, and even between communities within the same nation. The author shared his findings to date with all participants and learned from the experiences and expertise of all the contributors.

This report represents the outcome of the overall study, which will be used by UNESCO for ongoing strategic planning both for the general uses of ICTs for development, and for more specific applications in the role of ICTs in improving Sub-Saharan Africa's education processes. It is also intended that it will provide input for the upcoming World Summit on the Information Society. To quote UNESCO:

*“The findings of the study will serve as a ‘concept paper’ to be widely disseminated and to feed into the work of an African Expert Group to be constituted to further develop and promote this concept.”*

## 2.2. What is Meant by “E-Campus”?

A preliminary, informal survey by e-mail of more than 30 colleagues from HEIs throughout Africa was carried out. The simple question “What does the term ‘e-campus’ or ‘virtual campus’ mean to you?” exposed significant uncertainty, as indicated by the following range of answers:

- giving computers to staff and/or students;
- providing access to the Internet and the web;
- providing a range of online library services;
- putting our learning material online;
- improving our administrative systems via the latest software applications;
- creating national/global tertiary research networks via broad bandwidth connectivity;
- improving learning materials using multimedia;
- providing ICT based distance education.

A 1999 Commonwealth of Learning (COL) report<sup>2</sup> on Virtual Education highlighted the confusion regarding definitions of “e-campus” or “virtual campus”, stating that such terms are being “frequently used interchangeably with other labels such as *open and distance learning, distributed learning, networked learning, web-based learning, and computer learning*. “They defined a “virtual education institution” as

*“an organisation that, directly or indirectly, uses ICTs to provide educational services; this includes traditional agencies such as universities or non-educational organizations that distribute virtual educational services”.*

A follow up COL report<sup>3</sup> points out that the escalating interest in virtual education remains largely focussed on ways to use ICTs to deliver the traditional educational products (i.e., programmes and courses) in ways that make them more accessible, flexible, and cheap whilst generating revenues for the institution. However, the report identifies several trends, or “macro developments”, that are likely to bring about radical changes to current HEI concepts, including:

- new venues for learning;
- the use of “learning objects” to define and store content;
- new organizational models;
- online learner support services;
- quality assurance models for virtual education; and
- the continuing evolution of ICTs.

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<sup>2</sup> The Development of Virtual Education: A global perspective; Dr Glen Farrell, Editor, © The Commonwealth of Learning, 1999; <http://www.col.org/virtualed/index.htm>

<sup>3</sup> The Changing Faces of Virtual Education; Dr Glen Farrell, Editor; © The Commonwealth of Learning, 2001; <http://www.col.org/virtualed/index2.htm>



The British "e-University" project<sup>4</sup> provides an interesting *national* model, but, again, is misleadingly named since it is *not* an independent university, but a holding company owned jointly by a consortium of existing UK universities. Its purpose is to "establish a new way of providing HE programmes through web-based learning" by providing a source of expertise in the development of high quality e-learning programmes by existing universities, and a technical platform for the delivery of online and web-based programmes. It is significant that the UK Government has committed major financial resources to this project, which it clearly does not see as merely an additional function for the existing Open University.

A variation on this model<sup>5</sup> for "e-campus" is where students can enrol electronically from anywhere in the world for "high demand, expensive" courses (e.g. business management or accounting) provided fully online in partnership with a consortium of prestigious HEIs from many developed world countries. This new breed of virtual universities<sup>6</sup> is aiming at global markets by becoming *multinational providers* of quality e-learning. However, it costs "hundreds of millions of US dollars" to establish such institutions, and there are problems of quality control and accreditation since international accreditation is in its infancy. Also, protectionism is likely to create significant barriers for some time, where many countries prefer to prevent education imports via such measures as direct legislation, policy, and refusal to recognize foreign credentials.<sup>7</sup>

By contrast, UNESCO launched an initiative<sup>8</sup> in 2002 "to develop a universal educational resource available for the whole of humanity, to be referred to, henceforth, as Open Educational Resources", and defined as "technology-enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes". They are typically made *freely available* over the web or the Internet to support course development by teachers and educational institutions, but they can also be used directly by students. They include learning objects such as lecture material, references and readings, simulations, experiments and demonstrations, as well as syllabi, curricula and teachers' guides. Open Educational Resources involve three principal aspects:

- technology support including software standards for dissemination and exploitation of Open Educational Resources and requirements in terms of Internet connectivity;
- the methodology for organizing international cooperation in this area including worldwide identification of learning objects and frameworks for collaboration and user feedback;
- policy issues such as institutional commitment, financial support, intellectual property rights, and the export and import of educational material.

A further model<sup>9</sup> for "e-campus" talks of the need for a *fundamental paradigm shift* in the learning environment which creates a pedagogical model allowing multiple modes of cognition via asynchronous technological interfaces. The complaint is that current pedagogical models developed for a variety of forms of e-learning do not take full advantage of the digital medium. The mistake is often made of recreating the highly restrictive classroom-teaching model within an online learning environment. Instead, the pedagogy should allow for flexibility, interactivity, and media-rich and adaptive environments that both provide individualized learning and are also accessible to large numbers of learners for collaborations and group discussions. Recent developments in digital imaging, streaming audio and video, and interactive human-machine interfaces provide a wealth of opportunities to enhance the learning experience. In this model, web browsers are networked hypermedia interfaces that already allow such flexible, multimodal explorations for a given subject matter.

How do we choose which of the above models, or combination of models, is most appropriate for this study? It seems clear that "e-campus" involves much more than some incremental changes to the way tertiary organizations teach (not only in Africa, but throughout the world). It involves a fundamental paradigm change

<sup>4</sup> <http://www.hefce.ac.uk/partners/euniv/>

<sup>5</sup> [http://www.oecdobserver.org/news/fullstory.php/aid/577/Prepare\\_for\\_the\\_global\\_e-campus.html](http://www.oecdobserver.org/news/fullstory.php/aid/577/Prepare_for_the_global_e-campus.html)

<sup>6</sup> [www.cardean.edu](http://www.cardean.edu)

<sup>7</sup> The Learning Business: Can Trade in International Education Work?  
<http://www.oecdobserver.org/news/fullstory.php/aid/872>

<sup>8</sup> <http://www.unesco.org/iau/pdf/iaunew85.pdf>

<sup>9</sup> Changing the Interface of Education with Revolutionary Learning Technologies;  
<http://www.syllabus.com/article.asp?id=5663>



in how each tertiary institution, and the tertiary sector as a whole will function in the future. For the purposes of this study, it is assumed that the context for this tertiary paradigm change is provided by UNESCO's "Education for All" challenge<sup>10</sup>, which works toward the eradication of abject poverty throughout the world. The global tertiary sector, combined with their traditional values concerning the well-being of society, should be ideally positioned to address this. However, today's universities are faced with the perplexing task of balancing the tensions of Sir John Daniel's eternal triangle, i.e. to improve quality, cut their costs and to serve more and more students<sup>11</sup>.

Around the world today we need the equivalent of one large new university to open every week just to keep tertiary participation rates constant. But, most of the world cannot afford the established campus model. Traditional face-to-face delivery will simply not be able to scale up provision to the levels required by the global demand in a manner that is capable of maintaining a sustainable balance among the tensions of the eternal triangle.

*"Under the conventional campus model, individual faculty members carry the responsibility for teaching. They have relative freedom in organizing the learning environment regarding the implementation of the curriculum, and in how to teach in the classroom and assess learners. The campus model is robust and easy to organize, but the quality of provision is highly variable (excellent subject specialists/researchers are seldom good teachers). This model is extremely difficult to scale up, limited by the physical campus facilities and the number of learners that an individual faculty member can realistically manage. The distinguishing pedagogical feature of HE massification (e.g. the mega-universities) is that, instead of giving individual faculty the responsibility for teaching, sophisticated learning systems have been developed based on innovative divisions of labour where the responsibility for teaching is carried collectively by the organization. The differentiating feature of mass provision via open learning systems is that the institution teaches, not the individual teacher. By replacing the traditional lecturer model with a total teaching system where the functions of teaching are divided into a range of specializations, HE massification is able to scale up the delivery of quality teaching to levels that simply are not possible in conventional campus-based or dual-mode models."<sup>12</sup>*

There is a growing realization that mass provision represents the only viable solution to this global education crisis, operating as a major alternative (and additional) form of tertiary education. However, there is a grave danger that many forms of ICT enhanced distance education currently being practiced will be misinterpreted as the "massification solution", since, according to Dhanarajan:<sup>13</sup>

*"..there is as much ignorance among many in education as among those outside it about what distance education can do and cannot do, what does and does not constitute good practice in distance education, its efficiencies and governance."*

It needs to be better and more widely understood that the use of new ICTs is not necessarily distance education, e.g. according to Sir John Daniel:<sup>14</sup>

*"Today many people automatically associate the educational uses of the newer information and communications technologies with distance learning. This leads them to link three ideas and assume that technology-based teaching will foster distance learning and therefore show productivity gains over classroom methods. There will be widespread disappointment when this assumption proves false as it usually will."*

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<sup>10</sup> UNESCO, 2000. Text adopted by the World Education Forum Dakar, Senegal, 26-28 April 2000. <http://www2.unesco.org/wef/en-leadup/dakfram.shtm>

<sup>11</sup> Daniel, J.S. 1999. (reprint with revision) *Mega-Universities and Knowledge Media: Technology Strategies for Higher Education*. Kogan Page: London.

<sup>12</sup> Extracted from *Leading ODL Futures in the Eternal Triangle: a Mega-University Response to the Greatest Moral Challenge of our Age*, by Sir John Daniel and Wayne Mackintosh, 2002: in press.

<sup>13</sup> Dhanarajan, G. 1999. Forward in Harry, K (ed): *Higher Education Through Open and Distance Learning*. World review of distance education and open learning. London: Routledge and Commonwealth of Learning.

<sup>14</sup> *Distance Learning in the Era of Networks in ACU Bulletin No 138*, April 1999.

The widespread penetration of ICTs in education has begun to make the notion of “distance” difficult to interpret, while opening a great number of educationally and financially viable means of providing education. This conceptual shift involves acknowledging the ways in which both “contact” and “distance” provision have benefited from an increasing convergence between them, and recognizing that the result is a concept of teaching which transcends the categories of “contact” and “distance”. This is not merely a question of the ways in which ICT has become a key ingredient in “both” modes of provision but also the way in which the convergence forces our attention to focus on the design of learning systems in which “face-to-face contact” is only one potential resource amongst others, and not necessarily the most important or the most effective, as generations of students at “residential” institutions can confirm.

And, in parallel, irrespective of ICTs, a more mature, holistic concept of distance learning has recently emerged, i.e. Open/Distance Learning (ODL). As Anderson<sup>15</sup> points out, there is an important distinction between “distance learning” and “open learning”. “Distance learning” begins with a method – it is a way of teaching that does not require the presence of the teacher and learners in the same place at the same time (what John Thompson calls the “situation of co-presence”). But “open learning” began with a *purpose* – to develop new strategies at an affordable cost, to include all who seek the benefits of higher levels of education and training.

Therefore, in the light of the above models and concepts, and for the purposes of this study, the authors’ have produced the following:

**Working definition of “e-campus” or “virtual campus”:**

*The leadership roles that HEIs should be playing, immediately and in the longer term, by employing ICTs innovatively, efficiently and effectively to realise the goals of UNESCO’s “Education for All” initiative via a new tertiary paradigm, in “open” partnership with each other, the public sector, the private sector, civil society, disadvantaged individuals and communities (urban and rural), and the international community.*

What is this “new tertiary paradigm”? In line with UNESCO’s drive for “Education for All”, it can be thought of as a (crucial) subset of a more holistic “new learning paradigm”, and therefore the context for understanding and prioritizing issues related to “e-campus”. In adopting this paradigm, there will be major implications for the way we use ICTs for both *educational access*, and *educational administrative systems*. However, the driving force of the paradigm is the creation of new, appropriate, *ICT-enhanced learning materials* for Africa.

### 2.3. A New Learning Paradigm for Africa

As we create new technology-enhanced learning materials, it must be recognized that we are only at the beginning of a long and exciting global initiative. It must not be technology that drives this development, but improved pedagogy. Over the next two decades we will discover a great deal more about the innate components of each human ability, as well as the most appropriate stage in the development of the brain for it to be built upon and mastered<sup>16</sup>. However, if we take notice of what is already known, there is a great deal we can already be doing.

Much effort is currently being expended in digitizing existing text-based learning material and making it available electronically (particularly via the web). This has value, since it makes this learning material more easily available to those who can make use of it. However, it does not significantly address the fundamental learning issues (in fact, it perpetuates most of the problems experienced by learners). As multimedia-based new learning material is developed, the importance of “learning objects” will become clear. Another crucial issue that cannot be addressed in depth here, but is central to the new learning material, is the balance between *independent* and *interactive* learning. A greater understanding will emerge of which is the more appropriate learning/teaching mode, but it is highly complex since it depends on the age and sophistication of the learner; the subject material to be learned; the availability and capabilities of teachers, lecturers, tutors and mentors; and the possible groups of learners that can be formed. Indeed, a variety of group learning regimes (both physical

<sup>15</sup> Designing Better Education: Distance Learning, Open Learning, Designer Learning Presented at a Conference “Open Learning in Developing Countries”. October 2001.

<sup>16</sup> [http://www.naledi3d.com/news/VR\\_Evaluation.pdf](http://www.naledi3d.com/news/VR_Evaluation.pdf); pp. 35 - 53.

and electronic) appears to have particular potential for improving learning experiences, and for improving the quality of the new learning material on an ongoing basis.

Who is going to produce this wealth of new learning material? It cannot be left to teachers and lecturers alone for several reasons. Most of them are already overloaded with expanding class sizes, and a growing administrative load that seems to take them ever further from their learners. More importantly, very few of them have sufficient pedagogical expertise. The process must be driven both by current pedagogy, and by the major new insights that will emerge from the growing flood of relevant research. So the primary players are most likely to emerge from the tertiary/research sector, but will need the support of teachers/lecturers, ICT experts, public and private sector stakeholders, and, of course, the learners themselves.

The questions, central to e-campus, of where will this be done, how, when, and who will fund it have yet to be addressed. Clearly, the necessary facilities and capacities do not exist, especially in Africa, where the need is greatest. Some argue that poverty, and its “high tech” manifestation, the “digital divide”, will always be with us. They shrug and say that it is not, and will never be possible to provide even second class education to the 70% of Africa’s poor and remote population. But is this not the stuff of self-fulfilling prophecies?

At all levels, and in all African countries, the education sector is struggling to maintain the status quo, let alone make radical changes. Of all the levels, the tertiary sector has the best resources and capabilities. Certainly, within most of Africa’s HEIs there are many individuals who have the expertise to make a significant impact if we could pool their capabilities. But do the HEIs themselves (which often maintain the elitism and traditionalism established by their colonial sponsors) have the vision and flexibility to allow this to happen?

The message is clear. If we in Africa are only prepared to tinker with the current bricks-and-mortar based education systems imported “as-is” from the developed world, dominated by text-intensive “show-and-tell” methods, and unresponsive to our knowledge of how the human mind best learns, then that system will continue to deteriorate. Superficial tinkering has not worked to date. The changes need to be fundamental, and creating new learning materials relevant to Africa’s situation is an excellent place to start.

An inevitable response is that the developing world, and particularly Africa, does not have sufficient resources to develop its own new learning materials. Instead, we should wait, observe and take from the developed world whatever they produce over the next few years. In the meantime, we should persevere with the text-based learning material (mostly imported, usually from the old colonial powers for language reasons), because it is “better than nothing”.

If we examine the wide range of “lifelong-learning” needs of the broad spectrum of people in Africa, not just the elites, it becomes obvious that most imported learning materials are of little use to the many millions of excluded people for reasons of literacy, language and/or culture<sup>17</sup>.

**Literacy:**

Accurate figures for literacy in Africa are problematic for several reasons, including the different definitions of literacy used. Certainly, if the same measures of “functional illiteracy” for the USA used by Castells<sup>18</sup> are employed for Africa, levels above 70% would be common, especially in populations outside the main cities. Hence, the problems with text materials are significantly amplified in Africa, which perhaps should be thought of as a “text-averse” continent for the purposes of transforming education. Instead of importing the dominantly text-based new learning materials from the developed world, materials need to be developed locally that specifically address the needs of the majority. Can materials be produced where text is replaced by the much more natural voice? Can these materials use visualisation techniques rather than text to more accurately describe places, people, and events? Can these materials use interactive animation and simulation to allow learners to actively investigate how things dynamically happen and work? Yes, in every case – easily accessible digital multimedia tools exist for all these needs.

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<sup>17</sup> [http://www.naledi3d.com/news/VR\\_Evaluation.pdf](http://www.naledi3d.com/news/VR_Evaluation.pdf); pp. 54 - 70.

<sup>18</sup> Castells, M.; *The Information Age: Economy, Society, and Culture*; vol 3, End of Millenium, Blackwell, pp.70-165, 1998.

**Language:**

Many African people are at least bilingual, having both a local language, and a European language imposed during Africa's colonization. Since most of Africa's education material is imported from the old colonial powers, the colonial languages, not the indigenous language(s) dominate the education systems. This may appear reasonable in large cities, where many youngsters are exposed to and, therefore, naturally learn both colonial and indigenous languages in their infancy. But in the remote and rural areas, where most of Africa's population lives, the picture is very different. Here, only local indigenous languages are heard and learned in infancy. The colonial languages are taught (usually not very well, by teachers who themselves are seldom fluent) to 8-14 year old learners, long after the "natural window" for language acquisition in infancy has closed. Very few reach reasonable proficiency, even for speech, whilst the much more difficult reading skills are consequently poorer. Learners in these remote, impoverished areas of Africa have enough disadvantages without being forced to read and listen in a medium which is, literally, alien to them, producing at best, rote learning, at worst, no learning. Therefore the locally produced new learning materials should allow the learners to choose whichever they prefer of several local indigenous languages, both for voice, and text. This is already technologically possible, and as African languages are added to the now mature language technology platforms, it can grow significantly. Now it is the time to start the process. And who are better qualified than researchers in Africa's HEIs?

**Culture:**

For quality learning it is very important to contextualize the subject being learned – to paint the big picture first. This is particularly the case where learners are attempting to understand and master complex, often abstract concepts, which are especially common in maths, the natural sciences, and engineering. Man has always used analogies to handle such complexity, and they remain an excellent learning aid. However, analogies, like language, are often highly culturally dependent, and the analogies commonly used (especially in imported textual material) reflect the colonial, not the indigenous culture. Using a London bus to contextualize the learning of Newton's Laws of Motion throughout much of rural Southern Africa (where London buses are even rarer than at London bus stops) has been failing for decades. Sadly, it has usually been the intelligence of the African learners that has been questioned, rather than the quality of the learning material and teaching. Therefore, locally produced new learning materials should use culturally relevant analogies, often expressed via visualization, animation, or simulation rather than text. But the supporting language material (voice especially) should be in the appropriate range of indigenous languages.

The conclusion is that these multimedia-based new learning environments are essential for the realization of "Education for All" in Africa. It should be equally clear that little appropriate material is available for import. These materials must be locally produced to address the wide range of learning needs of Africa's excluded majority. So the understanding, creation, provision and management of these materials should be at the heart of "e-campus".

### **3. The African Tertiary Sector: the View from South Africa**

#### **3.1. Broad Trends in Tertiary Education**

Global access to tertiary education has grown from 6.5 million enrolments in 1950 to 88.2 million in 1997, growth of more than 1200%. This is attributed, at least in part, to a philosophical shift from “class to mass”<sup>19</sup>. In 1995 a little more than half of the world’s tertiary students (47 million) lived in the developing world, with a gross enrolment ratio mostly below 15%. However, the average for Sub-Saharan Africa was less than 3%. Saint<sup>20</sup> points out that at least 16 countries in Sub-Saharan Africa will need to double current tertiary enrolment in the coming decade just to maintain the existing and unacceptably low gross enrolment ratio. The imbalances between the global supply of tertiary education and the magnitude of the demand for access makes the imperative of providing a decent education for all one of the greatest moral challenges of our age. Meanwhile, most HEIs are forced to do considerably more with a great deal less.

Only 16 African countries provide free tertiary education, most employing cost-sharing between the student and government. While this is a common approach globally, it excludes large numbers of potential students throughout Africa, especially, since few have the opportunity to work whilst studying. For many African countries, expenditure per student is now below the level of \$1000, thought to be the minimum level required to provide an acceptable quality tertiary education.

Many countries in Africa have undergone austere structural adjustment programmes which resulted in cuts in educational expenditure. This, together with increasing debt burdens, governance problems, an unsupportive global economic context, and the impact of HIV/AIDS, means that the basic human right of access to education has been denied to many<sup>21</sup>. However, education has been recognized as a fundamental pillar of African development.

It is predicted that Africa will lose many of its teachers to HIV in the decade to come, further complicating the problem of Africa’s severe shortage of teachers. Education systems need adequate supplies of well-trained teachers, academic managers, and support staff. Of the 59 million teachers in the formal education sector globally, only 2 million are in Sub-Saharan Africa<sup>22</sup>. To achieve EFA in Sub-Saharan Africa, it is estimated that 700,000 more teachers will be needed by 2005, and 1.2 million by 2015.

Yet national education budgets continue to be cut. The impact of budget cuts is felt mostly with teacher training, where there is an urgent need for replacement of teachers who have died of AIDS-related diseases, as well as a need to generally improve the quality of teaching in Africa. A recent World Bank study, cited by the EFA Global Monitoring Report 2002, reported that achieving EFA goals by 2015 would require external funding of about US \$2.5 billion over the 15-year period. Sub-Saharan Africa will require 85% of this funding.

##### **3.1.1. HEI Collaboration and Partnerships – Global Experience**

Academics and researchers all over the world have always collaborated with one another across institutional, regional and national boundaries, particularly in research activities, sharing and publishing of research findings. The explosion of interest in teaching methodologies, new modes of delivery and quality assurance mechanisms

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<sup>19</sup> World Bank, 2000. Introduction to “Higher Education in Developing Countries. Peril and Promise”. Washington DC: The World Bank.

<sup>20</sup> Saint, W, 1999. Tertiary Distance Education and Technology in Sub-Saharan Africa. Washington DC: Working group on Higher Education, Association for the Development of Education in Africa, The World Bank.

<sup>21</sup> UNESCO (2002). EFA Global Monitoring Report 2002. Education for All. Is the World on Track? UNESCO Publishing.

<sup>22</sup> UNESCO (2002). Strategic Framework for Sub-Saharan Africa. In the Area of Teacher Training and Secondary Education Through Open and Distance Learning.



have also led to much greater sharing of experience and expertise in these areas, while associations of educational administrators at various levels are now far more commonplace.

Since the late 1960s, many national higher education systems around the world have employed a range of strategies and models to increase levels of HEI collaboration. Collaboration at the institutional level between HEIs and industry has long been fraught with controversy: faculty fear that industry's influence will restrict their freedoms in teaching and research; industry worries that HEI research is "market irrelevant" and that academic researchers lack the discipline necessary to respond to market pressures. However, several successful "science parks" have been established around the world, usually centred on a single HEI of global stature.

There is little evidence to date that either individual HEIs or consortia are turning their attention to UNESCO's global "Education for All" initiative. The goal of both appears to be to address their existing markets more efficiently and cost effectively (often by employing innovative ICT applications), but without breaking out of their traditional contact paradigm, and usually with the aim of enhancing their competitiveness as individual institutions.

### 3.2. Trends in South Africa's Tertiary Education

In South Africa, 21 universities and 14 technikons making up the current higher education (HE) institutional landscape have very different resources<sup>23</sup>, management capacity and culture. Much of this is the legacy of colonialism and apartheid, in particular, the link between institutional identity and historical provision of resources. The HE system is far from being optimally organized to meet the national human resource requirements, with confusion about purpose and differentiation. The system's potential is being held back by several factors, including unproductive competition, which is manifest by such trends as:

- new managerialism,
- volatility and expanded role of market forces in higher education,
- enhanced student mobility, and
- far-reaching changes in delivery modes.

The system is seen to be extremely wasteful and guilty of squandering valuable resources, delivering a poor return on investment measured in terms of graduate and research output. The inequalities in the higher education system in terms of access, programme offerings, quality, and infrastructure are generally acknowledged. A series of HE policy documents has been generated in the last decade to address these problems. In practice, however, implementation has been extremely slow and uneven.

In March 2001, the Minister of education released the most recent initiative, the National Plan for Higher Education (NPHE), which identified five strategic objectives to achieve "the overall goal of the transformation of the higher education system" through three main steering mechanisms: funding, planning and quality control. The NPHE is currently dominating strategic HE thinking, and will likely continue to do so for several years. It is good that it is forcing HEIs to reconsider their relevance in a changing South Africa by stressing the application and distribution of knowledge, by addressing the issues of quality management, and by encouraging institutions to change their modes of operation in order to deliver knowledge faster.

However, because of its pragmatic, cautious approach, the NPHE may, inadvertently, be deflecting the attention of strategic HE thinkers away from the even bigger issue of the global education crisis and the need for "Education for All". The traditional, "contact" form of teaching, rooted in the industrial paradigm, is not seriously challenged in the NPHE. Exciting alternatives related to the emerging knowledge paradigm (but requiring fundamental, not incremental change to mass provision supported by ICTs) are left for later consideration. This has serious consequences not only for the many thousands of potential students currently excluded from HE services in remote and rural areas throughout Africa, but also for potential, far-reaching, innovative ICT initiatives (national and regional) involving many HEIs in open, multisectoral collaboration.

<sup>23</sup> Extracted from Exploring Institutional Collaboration and Mergers in Higher Education, Piyushi Kotecha & Grant Harman, SAUVCA report, November 2001.

### 3.2.1. HEI Collaboration and Partnerships – South African Experience

To date, strategic inter-HEI collaboration in South Africa has been limited, and cooperation has been most successful in areas of technical and infrastructural support and services, e.g. enhancing library access, strengthening ICT capabilities, and establishing a central applications office. This may, in part, be due to the extensive financial support HEIs have received for such projects from donor agencies. Another likely reason is that these projects often provide economies of scale that could not have been attained by HEIs operating alone.

Arguably, the HEIs greatest and most successful infrastructure collaboration to date is the national academic and research network, where HEIs bought bandwidth from UNINET<sup>24</sup>. UNINET was never managed on a cooperative basis, but as a separate national project. The Tertiary Education Network (TENET), was formed to take over from UNINET in the provision of Internet access to universities, technikons and research institutions. At the same time, TENET is the corporate customer through which Telkom SA provides the actual networking services. Like UNINET, TENET has an annual turnover of around R15 million, but unlike UNINET, it does not operate routers, cache servers or other network devices. Instead it manages the contractual and business relationship with Telkom, the service provision relationships with each of the sites, and any assistance from the donor community.

The generic learning from various stages of this long-running project indicates that the best way to structure a collaborative venture between many HEIs, at least in the case of infrastructure projects in South Africa, is to *minimize the amount of sustained collaborative behaviour that is required*. This can be done by structuring the collaboration to operate as much as possible like a normal business.

### 3.2.2. Analysis of Current and Future Use and Outputs of ICTs by HEIs

There is a widely held belief in South African HEIs that they are falling behind the developed world in their application of ICTs. For the public higher education system, operating with extremely limited resources, this is especially serious. The best HEI systems are still not nearly as sophisticated as those in developed nations, and there are other institutions whose systems and levels of connectivity are negligible. The absence of appropriate technological support and the infrastructure necessary to secure high levels of connectivity is likely to disadvantage the entire academic and research enterprise of the HE system. And this in turn will severely compromise their ability to collaborate with, support, and teach the ICT sector (and, of course, all other sectors of society).

ICTs can be and are used in various ways by HEIs in South Africa and Africa. Hence, this analysis is structured in terms of teaching, administration, community service, and research.

**Teaching of ICTs:** The current ICT related courses provided by HEIs result in a range of accredited qualifications including degrees (graduate and post-graduate), diplomas, and certificates. These are primarily aimed at creating technicians, technologists and professionals for the long-established IT Sector and their traditional markets (e.g. military, finance, retail, etc.). These are important people, and Africa has an immediate need for many more of them, and of world class. However, there is a much broader range of ICT capabilities that need to be created to satisfy all the growing needs of Africa's emerging knowledge society. This is a chicken and egg situation – if we don't provide such people, society will not grow, i.e. it cannot be demand-led. Our society must, collectively, take the risk of anticipating (and thereby stimulating) the demand.

There are three main areas of ICT teaching/learning material that are widely needed:

- **ICT Literacy/Fluency:** Most of this education is likely to occur prior to, or outside the tertiary sector. However, much current literacy material is outdated (e.g. “computyping”), and the dynamism of the ICT sector demands updating annually, at least. In addition, much of the material has not been designed for the many thousands of potential learners from rural and remote areas. In such cases it is essential that, for example, language and cultural issues are catered for if we are serious about bridging

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<sup>24</sup> Extracted from: Leatt, JV & Martin DH, CITTE series, 2000: Reflections on Collaboration Within SA Higher Education by Two Bloodied but Unbowed Participants.

the "digital divide". Hence, improved ICT literacy learning material that satisfies these needs should be created on an ongoing basis.

- **ICT Benefits Awareness:** This needs to be created for all members of the leadership corps of African society, including the public sector, private sector, civil society, academia, rural communities, etc. The emphasis of such courses should not be on the technologies themselves, but on the potential impact (especially benefits) of ICTs, now and in future, tailored to the areas of society most relevant to each leader (e.g. economic growth, poverty alleviation, quality of life, information ethics, knowledge sharing concepts, etc.). There is much to be done in most of these areas at both graduate and post-graduate level, not just for South Africa, but for the whole of Africa's leadership corps. Clearly, this cannot best be addressed by any sector (ICTs, tertiary, public, etc.) acting in isolation.
- **ICT Technologists and Professionals:** The theoretical content needs in this area for the ICT sector are being addressed by the current courses and material of many existing HEIs. The major concern from the private sector is that far from enough appropriately qualified people are being produced, especially from the black community and women, and concerns are also voiced that more dynamic course components are permanently outdated (due to the years currently required by HEIs to rewrite curricula). What is not being addressed, however, is the large and growing need for such ICT technologists and professionals in other sectors of society, (private, public, development, etc.). These people need to be educated to comprehensively understand not only their sector (e.g. agriculture, tourism, etc.) but also all aspects of ICT relevant to that sector (current and future).

**Use of ICTs in Teaching and Learning:** Put simplistically ICTs can be used directly to improve learning in two ways: via the delivery of learning materials, and to create improved learning materials. However, both of these have many subcomponents, and the picture is further complicated by the mode of learning being employed.

Two concepts are frequently used in this area. Although they overlap, there are significant differences, and therefore they should not be confused with each other:

- **Technology-enhanced distance education:** This has long been used to increase the range of the traditional contact mode of teaching, often via broadcast media. The synchronous form uses TV, radio, and video- and tele-conferencing, whereas the asynchronous form uses video- and audio-tapes via TV and radio, and more recently via the web. Here the pedagogy is fixed, i.e. the traditional contact mode.
- **Technology-enhanced teaching:** This first emerged in the '70s as text based CBE & CBT. More recently, a wide range of improvements to current learning materials has become possible via the application of interactive digital multimedia: text, graphic, audio, video, animation, simulation, virtual reality, etc.; and via the asynchronous delivery of digital material. Here the pedagogy is often assumed to be contact, but a wide range of more appropriate alternatives are possible.

Some residential African HEIs (particularly in South Africa) have been experimenting for some time with both types of enhancement. The most strategic has been the adoption of broadcast mechanisms to provide lectures (usually live) at a distance, thereby reaching thousands more students at satellite campuses and other delivery sites. Less strategic has been the adoption by lecturers (individual and groups) of one or more aspects of ICT-enhanced teaching, often to supplement their lecture material (verbal and textual).

The advent of the World Wide Web is further complicating the above already complex picture. The web allows any learning material, once digitized (e.g. text, graphics, voice, video, animation, etc.) to be made available anywhere in the world that has Internet connectivity, either synchronously or asynchronously. It should be emphasized that the web has introduced the additional major attribute of several levels of *interactivity*, both synchronous and asynchronous, ranging from email and "chat rooms", through interactive learning environments (taking much from the latest web-based multi-user games), to voice and/or video-conferencing over IP.

Of course, availability of bandwidth and PCs with sufficient power at access points currently imposes a variety of restrictions on what can be received by whom, when and where. But the technology exists to enable



us to develop a wide variety of improvements to our teaching materials and the ways, in which it might best be delivered to a range of learners (which go together to create the learning experience). The restrictions come from a combination of HEI “traditionalism”, fuzzy political vision, and private sector indifference. Technology is often used as the scapegoat for inaction in this complex, but exciting field of opportunity.

Although the above mentioned experimentation, both with technology-enhanced teaching and learning, as well as technology-mediated distance learning, often touches on aspects essential for the massification of higher education, it does not represent a national, strategic approach to this major societal need. Instead, individual contact HEIs, and the HE consortia, are focussing more on their improved competitiveness, both locally and globally. The ODL institutions, on the other hand, have long-established competencies in massification, albeit of the text-based correspondence type.

ICT-based massification is not yet recognized as the long-awaited key to “Education for All”, but is seen as an interesting, but non-essential, area for consideration at some stage in the distant future. There is a major, commonly held misunderstanding here. The ICT-based massification of HE that already could be solving the African (and global) need for “Education for All” incorporates open distance learning as an essential component. But few manifestations of distance education currently practised by HEIs can be successfully scaled up to mass provision. Massification always contains a form of distance education, but most current forms of distance education *cannot* lead to massification.

Clearly, there is major potential here for collaboration between the HEI sector as a whole with the ICT sector. However, there is great confusion and misunderstanding in this area. It would be very useful if UNESCO could help clarify the issues raised in this section, so that the potential partnerships could be aimed at an holistic, national/regional ICT-based HE massification strategy, rather than ad hoc, wasteful “technology push” intra-institutional initiatives.

**ICTs and HEI Administrative Processes:** For many years, South Africa’s wealthier HEIs (unlike much of the rest of Africa) have been using ICT applications for their administrative processes (e.g. finances, human resources, salaries, etc.). Many of these applications have been migrated, with variable success, from their original mainframe environments to a variety of server-based distributed network systems. This provides the historic context of the “computing centre” models employed by most HEIs. Most of these centres (as in many other large organizations in South Africa) continue to struggle with the impact that the Internet, followed by the web are having on their environments. End user computing, mobile computing, multi-tasking, intranets, extranets, web sites and portals are a far cry from the old days when a few select users were happy to queue (often repeatedly) for the outputs of the mainframe.

Computing Centres look to the HEI executives for understanding of their plight and to provide appropriate help, whilst the HEI executives look to these same computing centres’ “ICT experts” to help them understand the bewildering growth of possible applications of ICTs in HEIs. Neither can cope, alone. As explained earlier, the most successful consortial collaborations between HEIs have been in the area of ICT infrastructure. But much broader collaboration is needed. The failure of HEIs to act collaboratively and share expertise has also highlighted other disparities such as the lack of capacity of some institutions to engage in meaningful planning exercises. While some have Management Information Systems in place and the capacity to use them, others have been unable to generate data that is even remotely reliable or useful.

Finally, the administrative ICT systems required to satisfy the needs of HE massification must be addressed, but appear to be overlooked. It has been described above how ICTs are essential for the creation and delivery of open distance learning materials in mass provision mode. However, none of this can succeed without designing and building the administrative back-end processes (e.g. study materials and scheduling processes). These ICT systems must manage hundreds of thousands of students interacting electronically in a range of modes with learning material, lecturers, tutors, administrators, other students, and whatever knowledge they may need from the web. This is a major initiative which needs to be addressed in phases, and will take several years to complete. This poses a major opportunity for collaboration between the HEI and ICT sectors, and it is an area where the advantages of Open Source Software (OSS) may prove particularly valuable.

**ICTs and HEI Involvement in Community Service/Development:** Community service has always been an important output of HEIs. Many students and staff devote their time, usually on a voluntary basis, to outreach

projects that allow them to utilise their expertise in communities, where such services are generally not available or affordable. Such initiatives are sometimes run on an individual basis, or by groups, or managed by one of the more formal structures in the HEI (e.g. legal aid, health missions, arts and crafts initiatives, community projects, etc.). In recent years, many such projects have taken on an ICT component, e.g. school connectivity, tele-centres, and the provision of computer training centres in or near disadvantaged areas to provide ICT literacy and further skills.

Although commendable and necessary, most of these projects are dealing with the symptoms of poverty, disadvantage and exclusion, rather than addressing their cause via a more strategic (organizational or national) approach. By contrast, HE massification directly addresses one of the most fundamental causes of disadvantage and exclusion, i.e. enabling all individuals to understand, develop, and use the power of their own minds in the context of their indigenous environments.

**ICTs and HEI Research:** For many years, some individuals and groups in South Africa's HEIs have been doing world class research into several aspects of science which contribute to ICTs, or into the ICTs themselves, although standards vary significantly. Nevertheless, the conversion of HEI-based ICT research into tangible products and services remains underdeveloped.

ICT needs to be better understood as an enabling technology in the context of all other sectors of society. This raises the question of how well ICTs are being used in HEI research within disciplines not usually directly associated with such technologies (and where some researchers may not be ICT literate), e.g. social science, arts, law, etc. It would be useful to pursue this line of thought in this study, since innovation often stems from such non-intuitive associations.

In the previous sections, which discuss ICTs and HEI teaching, administrative processes, and community service, significant areas emerged for potential collaboration between an indigenous ICT sector and HEIs. Much can be done in each of these areas by applying existing ICTs to current HEI needs, especially if the HEIs collaborate as a sector driven by national imperatives. However, there are many more areas of potential developmental collaboration, which require a wide range of collaborative research initiatives. This is particularly true of the need to develop the mass provision of higher education in the South African context, leading to collaborative research opportunities in:

- the development of multimodal, multimedia-based learning materials;
- ICT-enhanced remote access and student support; and
- seamless administrative systems to handle the interactive needs of hundreds of thousands of open distance learners.

## 4. The African ICT Sector: the View from South Africa

*"The next application for the Internet is going to be education. Education over the Internet is going to be so big it is going to make e-mail usage look like a rounding error in terms of Internet capacity it will consume".*

*John Chambers CEO Cisco<sup>25</sup>*

### 4.1. Broad Trends in ICTs

The arrival of personal computers (PCs) a quarter of a century ago turned everyone (theoretically) into a potential computer user, and began to undermine the mystique and power of the "IT priesthoods" serv-

<sup>25</sup> Quoted from Future Skills, Future Strategies. Human Resources Inc. [local.cips.ca/queencity/Events/archivedEvents/2000-01/SpringSeminar01/CIPS%20Future.pdf](http://local.cips.ca/queencity/Events/archivedEvents/2000-01/SpringSeminar01/CIPS%20Future.pdf)

ing their mainframe(s) nestling deep within most large organisations. It was inevitable that these PCs would be linked to the Internet, which was established in the USA in the 1960s and 70s. In the 80s and 90s, the PC/Internet combination converted the Internet from a tool used by some military and academic cliques into the global phenomenon we are still trying to come to terms with today. This, in turn, has changed the nature of the PC (and its most popular applications) from being predominantly a processing tool into a powerful and highly flexible communications platform.

In the context of the PC/Internet combination, three powerful trends are driving the information revolution:

- **Cost of communicating:** The transmission cost of sending digital data has decreased by a factor of 10,000 since 1975. This is largely due to technological developments in fibre optics enabling considerable bandwidth at lower cost, and microelectronics that have reduced costs of telephone networks by replacing electromechanical switching. Smart wireless technology is also having a huge impact as evidenced by the phenomenal growth in global cellular telephony.
- **Power of computing:** Computing power per dollar invested has also increased by a factor of 10,000 since 1975. Integrated circuits combined with the increase of transistor density on microchips and significant gains in the economies-of-scale in the production of these components are largely attributable for this progress.
- **Convergence:** Analogue technologies are being replaced with digital technologies. Using a single binary code system, digital technology is capable of dealing with voice, video and computer data over the same network; whereas in the era before convergence, independent carrier technologies were necessary.

Taken together, these trends have given rise to the merging of the computing (IT) and the communications sectors into a single sector referred to as the Information and Communications Technology (ICT) sector.

The many potential roles for ICTs in development are being recognized globally<sup>26-27</sup>. International development organizations are promoting universal access to telecommunications as an integral part of their initiatives. Although ICTs can provide appropriate solutions, many of these initiatives have promoted narrow and problematic assumptions about what “access” to ICT means, i.e. the availability of telephony, or in some cases, physical access to computers within a certain distance from home.

It is well known that ICT penetration in Africa is very low compared to developed countries, but an excellent source of relevant data is regularly provided by Jensen<sup>28</sup>. Of the 818 million people in Africa, statistics from 2001 estimate that only:

- 1 in 4 have a radio,
- 1 in 13 have a television,
- 1 in 35 have a mobile phone,
- 1 in 40 have a fixed line telephone,
- 1 in 130 have a personal computer (PC),
- 1 in 160 use the Internet,
- 1 in 400 have pay-TV.

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<sup>26</sup> Marker, P., McNamara, K. & Wallace, L. (2002). The Significance of Information and Communication Technologies for Reducing Poverty. London: DFID.

<sup>27</sup> International Labour Organization (ILO). (2001). World Employment Report. Life at Work in the Information Economy: ILO.

<sup>28</sup> Jensen, M. (2002). The African Internet – A Status Report.

African Internet users are currently estimated between 1.5 and 2.5 million (excluding North and South Africa). This translates to approximately 1 user in every 250-400 people compared to the global average of 1 in 15, and a North American and European average of 1 in 2 people. The cost of Internet access is still too high for the majority of the African population, e.g. the cost for a local dial-up account is approximately \$60/month, which is much higher than the average African income. This cost is compared to \$22/month in the US. This is equivalent to just less than 20% of GDP per capita for African people, compared to the global average of 9% and only 1% in high-income countries.

The New Partnership for African Development (NEPAD, 2001)<sup>29</sup> provides an African-owned and African-led effort to promote accelerated economic growth and sustainable development for Africa, based on partnerships between African countries themselves, but also between Africa and the developed world. NEPAD explicitly recognizes ICT as a key priority in development efforts for the continent, and identifies several areas for intensive ICT use, including support of democratization and good governance; integration into the information society; provision of training; use in research; enhancement of trade opportunities; support of regional distance learning and health programmes; input to conflict management; and the control of pandemic diseases through early warning systems. The importance being accorded to ICT for the continent is highlighted by the fact that ICT is included as one of four programmes proposed for fast-tracked implementation (the other three being communicable diseases, debt reduction, and market access).

## 4.2. The South African ICT Sector

In 2002 South Africa was the 20th largest country market for ICT products and services, accounting for 0.6% of worldwide revenues<sup>30</sup>. Its ICT market in 2000 was estimated at R31.7 billion with an anticipated growth of 14% in that year<sup>31</sup>. BMI-TechKnowledge is predicting that the industry will grow at about 11% a year for the next five years with spending mainly by the financial sector, utilities companies and government<sup>32</sup>. Estimates are that the ICT market will reach R57 billion by 2006, as compared to a global ICT spend in excess of US\$1.4 trillion. Hardware purchasing accounts for 46% of these figures, and 36% of revenue is derived from services (and growing rapidly). Software accounted for only 18% of ICT expenditure in 2000. If the telecommunications market is included, with estimated revenue in 2000 of R48 billion, then the total ICT market in 2000 was R79 billion.

### 4.2.1. ICT as an Enabler

The current restrictive definitions for the ICT industry do not take into consideration the revolutionary role that ICT is playing across all sectors of society, where users can as easily become producers of digital information, and producers become extensive users. Increasingly, the definition of ICTs, therefore, includes the development of content. For this reason the SAITIS<sup>33</sup> sector framework proposed a far broader definition that includes not only infrastructure and applications but also content. It is also useful to include here the model that formed the basis for the South African Foresight<sup>34</sup> study, which includes a separate section on the role of ICT as an enabler in society (schematic, p. 44).

<sup>29</sup> <http://www.dfa.gov.za/events/nepad.htm>

<sup>30</sup> SANEC – South African Netherlands Chamber of Commerce Trade Directory 2001 - 2002 - Economic Profile South Africa.

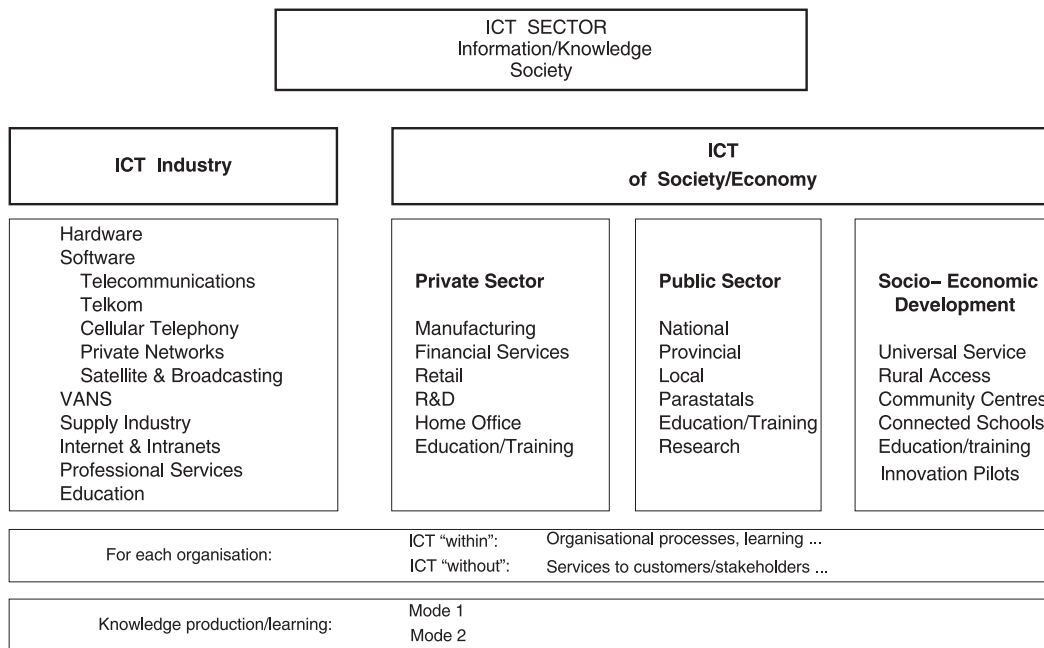
<sup>31</sup> BMI-TechKnowledge Communications Handbook 2001, p. 526.

<sup>32</sup> Africa Telecomms and IT Decisions. <http://www.mbendi.co.za/bmi-t/newsletter/latest.htm>

<sup>33</sup> <http://www.saitis.co.za/>

<sup>34</sup> DACST (October 1999). National Research and Technology Foresight Project: ICT, p. 22.

To illustrate the pervasiveness of the ICT user base, and therefore the need to analyze the role of ICTs in the broader sense, data from a recently completed audit<sup>35</sup> of the ICT sector in South Africa found that the sector itself employs about 212,200 people, of which about 88% (186,400) can be defined as ICT users. Other sectors employ about 7.3 million employees, of which about 26% (1.8 million) regularly use computers as part of their work.



#### 4.2.2. The Diffusion of ICT into South African Industries

A recent study<sup>36</sup> undertaken by the Department of Trade and Industry examined the rate of diffusion of ICT by eight industry sectors. This was the first study of its type in South Africa which attempted to understand in more depth, which ICTs were being used in industries, where the gaps were, and possible suggestions on how the ICT industry could play a role in promoting the economic growth potential of those industries locally and internationally. Over 400 interviews were conducted with over 42,000 response items that were analyzed.

With few exceptions, South African organizations in the selected sectors appear slow to adopt ICT anywhere other than in the traditional areas. Indeed, many organizations are still trying to install and integrate routine operational systems such as inventory control and customer relationship management systems. There is little evidence of so-called transformational usage such as electronic business (although specifically excluded from the study were the retailing and financial services sectors, both known to be in the forefront of such ICT usage).

Of particular significance to this study is that *universities and technikons did not feature in any manner in any of the eight sectors*. They were not seen as a source of information or training, traditional areas of activity for HEIs. Also, there is general consensus that the respective Sector Education and Training Authorities (SETAs) in all sectors are not making enough effort to promote and provide ICT training, nor is the ISETT SETA<sup>37</sup> playing any role in promoting the more pervasive use of ICTs.

<sup>35</sup> ICT skills audit finds shortage. ITWEB, 29 August 2002; <http://www.itweb.co.za/sections/business/2002/0208291159.asp?O=TE>

<sup>36</sup> Esselaar P.; James, T.; Miller, J. and Sibthorpe, G. (July 2002). ICT Diffusion and Applications in Eight Industry Sectors in South Africa. [www.tips.org.za/research/dtipsp](http://www.tips.org.za/research/dtipsp).

<sup>37</sup> <http://www.isett.org.za/>

The perceived low levels of innovation, as judged by the industry leaders themselves, in most of the sectors is a major cause for concern and possibly reflects the low levels of interaction between researchers and the industry. In addition, the lack of effective and affordable telecommunications services together with insufficient available bandwidth is reported as the single most important impediment to ICT diffusion within each sector and is regarded as a major cause of competitive disadvantage in a globalising world.

In terms of our focus in this paper on the role of HEIs in the development of a knowledge society, and the use of ICT as an enabler, it is important that many of the sectors expressed the need to create a much more "ICT-aware" society.

#### 4.2.3. The Supply and Demand for ICT Professionals – are HEIs Producing Enough?

**Graduates Outputs from HEIs:** One of the major roles of HEIs is the output of quality graduates who are useful to industry and society, and who are equipped with the appropriate types of skills. The recent ISETT SETA study estimates that up to 165,000 students will be needed to address ICT skills shortages in the near future. Quoting from a recent study by UNISA's Bureau for Market Research:

*"... the educational profile of South Africa's population is of such a nature that the South African workforce is not educationally equipped to keep the modern sector of the economy growing without tension. ...only about 8% of the population older than 20 or about 4,2 % of the total South African population had a matric plus some form of post-matric education or training. In terms of percentages this means that in 1999 only about 8% of the South African population of 20 years and older could be classified as falling into the high-level human resources (HLHR) category."*

A report by the South African Department of Trade and Industry<sup>38</sup> indicates that the support of post-graduate study in the areas of engineering, the management of enterprises and the management and diffusion of ICT will be necessary but not sufficient to increase the numbers of graduates required for South Africa to participate in the new economy. Alternative mechanisms involving closer collaboration between industry, learners in the workplace and those emerging from the schooling system will have to be developed<sup>39</sup>.

**ICT professionals:** Because of the lack of a professional body that embraces all categories of ICT professionals, there has been a dearth of reliable data on their numbers and skills in South Africa. Estimates presently range between 54,000<sup>40</sup> and 74,500<sup>41</sup>, while Forge-Ahead BMI-TechKnowledge's survey of black IT companies and professionals, indicates that there were about 5,000 black IT professionals in South Africa in 2000. A cause for serious concern is that no convergence is anticipated between supply and demand during the period ending in 2009.

**Are HEIs Producing the Right Types of Skills?** Little empirical data has been produced to determine whether HEIs are producing graduates with the right levels of skills. Anecdotal evidence from the SAITIS Baseline studies and workshops suggest there is a mismatch between the skills produced by HEIs and the needs of industry. However, there have been few attempts at collaboration between HEIs and the industry to jointly develop curricula, and this is likely to be the case throughout Africa.

**Industry's perception of HEIs:** A recent ICT diffusion study of eight industries showed that HEIs were hardly considered as sources of information or training in ICTs. The reliance on vendors for learning material about

<sup>38</sup> South African Department of Trade and Industry (July 2001). Study on the Development of High Level Skills in Engineering, Information Technology and Management (unpublished).

<sup>39</sup> James, T.; Esselaar, P. and Miller, J. (2001). Briefing Paper: Towards a Better Understanding of the ICT Sector in South Africa: Problems and Opportunities for Strengthening the Existing Knowledge Base. Paper presented at the 2001 Annual TIPS Forum. [www.tips.org.za](http://www.tips.org.za)

<sup>40</sup> International Labour Organization (ILO). World Employment Report 2001. Life at Work in the Information Economy.

<sup>41</sup> ISETT SETA/Department of Labour. ICT Skills Audit Finds Shortage. ITWEB, 29 August 2002 <http://www.itweb.co.za/sections/business/2002/0208291159.asp?O=TE>



ICTs is of great concern as it is unlikely that industry will be prepared to expose details of innovative, leading-edge ICT applications. Yet such training is essential for South Africa's ICT sector to grow its capacity for product innovation and improved efficiencies. There is a growing belief that the use of Open Source Software (OSS) as an education tool can by-pass this problem, and that HEIs should re-establish their relevance to the ICT sector by using OSS to produce graduates with greater objectivity and understanding.

#### **4.2.4. ICT Research and Innovation and HEIs**

Research involving the ICT sector is fragmented and of variable quality. Globally, the ICT research arena is essentially interdisciplinary and crosscutting, and must cope with a rapidity of change unheard of in many other research disciplines. Some good research is taking place in South African universities. But it is happening in many different faculties that probably do not talk to each other very frequently, e.g. Computer Science, Economics, Business Systems, Law, Social Science, Electronic Engineering, Biological Sciences amongst others. More research is underway in technikons, usually of a more applied nature, as well as by consultants, international funding agencies, and the private sector. Little of it is coordinated.

ICT-related research programmes, projects and results need to be distributed more widely and effectively, within institutions and between them, as well as between disciplines. The linkage between researchers and the industry needs to be strengthened to allow new thinking to penetrate into the existing businesses that will face new challenges in the new economy. The importance of creating mechanisms to stimulate such linkages cannot be overstated. Both physical environments (e.g. centres of excellence, innovation nodes, transitional structures) and virtual environments (e.g. electronic workspaces, portals, etc) need to be investigated and established to work as flexible networks of research, innovation, and production.

## **5. E-Campus and African HEIs: Findings from a Five Nation Study Tour**

Within the context described in the previous sections, the author paid brief visits (usually less than three full days) to five African countries to assess the perceptions of "e-campus" held by a range of relevant and important stakeholders in each country (see Appendix A for full list). The inputs from these stakeholders obtained either in interviews or workshops are reflected below. Although the material has been condensed (original notes are available on request), the full range of perceptions has been retained, and the participants' own words have been used as often as possible to reflect the spirit of their contributions. The major purpose of this section is to capture the dominant perceptions of these stakeholders, their awareness and understanding of the issues, and their priorities. Hence the authors have not attempted to ensure the accuracy of what was said.

### **5.1. Senegal**

The author visited Senegal between 29 January and 1 February 2003. He interviewed a range of stakeholders and visited relevant institutions where possible. The full list of participants, their institutions and other relevant details are provided in Appendix A.

The main host was Dr Aboubaker Barry, who provided translation services, outstanding organizational support, and transport, as well as valuable advice regarding both ICTs and HEIs in Senegal.

#### **5.1.1. Summary of Senegal's Tertiary Sector**

Senegal has approximately 29 HEIs, 23 of which are in the capital, Dakar, and three in Thies, Senegal's second city. Two are large public institutions, with several teacher training institutions, and most of the rest being small, young, private institutions providing only a few specialists or sustainable subjects, e.g. management and technical courses<sup>42</sup>.

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<sup>42</sup> <http://elctl.msu.edu/AUP-temp/frameset.php?page=ed-directory.php>

There are two public universities. Université Cheikh Anta Diop de Dakar (Dakar University)<sup>43</sup>, with 22,000 students and 700 staff in 23 faculties. It was initially established in 1918 as a colonial college, and now has one main campus, and four satellite campuses. Gaston Berger University of Saint-Louis<sup>44</sup>, has 2,100 students and 70 staff in seven faculties, and was established in 1990 in an isolated campus, 17 km outside Dakar.

The author visited Dakar University and also one of the small, young, private institutions, the Université du Sahel<sup>45</sup>, which was established in 1999. It has about 300 students, and 80 staff, 65 of whom are shared with the larger HEIs (there is a shortage of quality teaching academics in Senegal, as in the rest of Africa). It is planned that the single campus will grow to several small campuses in future to cope with the growing demand.

The Senegalese government plans to establish regional colleges specializing in the main economic fields of that region. They have begun in Bambey with an agricultural college. This is planning the second of these: a polytechnique providing courses in a wide range of engineering fields. There are five teacher training colleges for teachers at elementary schools. Finally, ENS (the Ecole Normale Supérieure) for secondary teachers has become part of Dakar university, and concentrates on print-based distance education.

### 5.1.2. E-Campus: Related National Policy and Strategy Issues

Senegal's government is aware of the value of ICTs for national development, e.g. President Abdoulaye Wade underscored the importance of the Africa Regional Conference on the World Summit on the Information Society (WSIS) held recently in Bamako, Mali, given that ICTs are a prime focus under the NEPAD framework<sup>46</sup>.

The Senegalese ICT strategy defined by the Telecommunications Act in accordance with the nation's economic and social development plan, is built on the principles of:

*“transparency, healthy and fair competition, equal treatment of users, respect for confidential correspondence, respect for the conditions of an open network, and of the contribution of operators to tasks and responsibilities relating to the development of a universal telecommunications service, respect for international agreements and treaties relating to telecommunications and the impartial interconnection of networks.”<sup>47</sup>*

However, Senegal's government is struggling to implement initiatives which bring the real benefits of ICTs to society. For example, although the Ministry of Education has negotiated reduced rates for school modem access, many schools still cannot afford them, particularly in the most disadvantaged areas where, arguably, the need is greatest.

Senegal's HEIs are not yet playing a collaborative, strategic “thought leadership” role in anticipating and guiding developments central to a national ICT policy.

### 5.1.3. ICTs and HEI Administration (Including Institutional Policy and Strategy Issues)

Dakar University's Computing Centre was set up in late 1970s to support desk top computing across the campus, and train researchers on specialised packages. The development of Internet connectivity, (which began in 1992 with a 64k link with the USA via MCI), and the fibre-optic backbone (which links the main campus and

<sup>43</sup> <http://www.ucad.edu.sn>

<sup>44</sup> <http://www.ugb.sn>

<sup>45</sup> <http://www.cyg.sn/unis>

<sup>46</sup> [http://www.uneca.org/eca\\_resources/Press\\_Releases/2002\\_pressreleases/pressrelease0902.htm](http://www.uneca.org/eca_resources/Press_Releases/2002_pressreleases/pressrelease0902.htm)

<sup>47</sup> [http://www.apc.org/english/rights/africa/research\\_reports/senegal\\_eng.pdf](http://www.apc.org/english/rights/africa/research_reports/senegal_eng.pdf)



four satellite campuses) has allowed the centre to evolve as a distributed, coordination environment, rather than a centralized control function. The director of the computing centre is the highest ICT authority in the institution, reporting to the executive team. He also administers Senegal's .sn domain.

Dakar faculties have a high level of autonomy, so institutional policies are seen as recommendations that need not be complied with. In 1997 a commission representing most faculties was established to develop the institutional ICT strategy. This has proved a very lengthy process, and implementation of strategic ICT initiatives remains a problem. For example, a recent recommendation that 5% of each faculty's budget should be reserved for strategic ICT developments has not been put to the Board of the University.

Universite du Sahel is a small university with no computer services department. The President and CEO is a computer scientist, and therefore plays the role of the institution's high level ICT strategist. However, he is supported by his computer science staff, interns, and post-graduates. Rather than create a computing centre, the ICT policies and strategies are being flexibly developed as the ICT facilities evolve and grow, run on a part-time basis by existing staff. The current policy is "appropriate ICTs for efficiency and effectiveness", but formal ICT policy and strategy documents will come later. Since the institution is only five years old, there are no legacy systems, just servers and workstations. They are currently initiating Internet connectivity (T1 from Sonatel). The higher power workstations are allocated to staff and students on the basis of needs, not status. The CEO himself does not have a "high-end" PC. "E-learning" is already a component of most courses, and it is anticipated that some 50 students will register in 2004 in distance mode from several neighbouring countries.

The African Virtual University<sup>48</sup> (AVU) is the first major initiative in Dakar (and Senegal) in electronic distance education. The AVU was first installed in Dakar at the end of 1997 with little institutional involvement. Educational services were delayed until early 1999 because of the need for faculty to understand the system, and debate how it should be used in the Senegalese context. It now serves approximately 200 students per year, supplementing existing courses (e.g. Computer Science, Medical Science, Maths, Business, and Languages), helping students with problems in these courses, and making electronic documents available.

The AVU has played a role in spreading awareness of ICTs at Dakar University, where few lecturers appreciate the potential of ICTs, being intimidated by them rather than enthused. Because of the foreign lecturers, it has proved necessary to use local tutors to try to overcome many students' cultural and language-based learning problems.

#### **5.1.4. ICTs and Access in HEIs (Including Literacy Issues)**

Dakar University has an excellent, well-equipped library with significant PC lab facilities. However, these facilities cannot satisfy the growing demand for access from both the staff and student bodies. Since 2001, students have put computer labs at the top of their "wish list", which has stimulated significant growth in PC numbers, most faculties now having at least some PC lab facilities. However, Dakar's student representatives link ICT literacy with the availability of PCs. They believe that there are not enough PCs in the University, and advocate at least a ratio of 1 PC for ten students.

Dakar's Computing Centre carries out ICT training for staff, but only on demand from departmental heads. There is no institutional policy on staff or student ICT literacy. However, ICT literacy courses are being included in the curriculum of the Science faculty, and other faculties are showing more interest, particularly at graduate and post-graduate level. Similarly, Dakar has no strategy for promoting ICT literacy for the general public. However, Computing Centre is providing a range of ICT courses at subsidized costs to encourage family and friends of staff and students to become ICT literate.

At Universite du Sahel, staff currently have three PCs for administrative computing. Generally, every two students share a PC, although every computer science student has their own PC. In addition, there are PC labs for the residential students, but no "e-library" services yet. The president believes that "everybody should be

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<sup>48</sup> <http://www.avu.org>

ICT literate", since ICT has a role in almost every area of life. Therefore, all staff are given ICT training, whilst all students, whatever their course, must complete ICT literacy courses that are recognized by the private sector. E-mail access is provided free to all, since "it promotes a culture that makes everyone available to everyone". As a reward mechanism, students who pass with A+ are given an old, but useful PC (e.g. Pentium 130). The president is convinced that as the number of PCs has increased, students' results have generally improved.

ICT literacy for Senegalese women is a major problem. The perception is that women are excluded from ICT initiatives and careers, including in HEIs. The tertiary sector mostly says the "politically correct" things about gender issues, but "does little to create a more balanced society". Famafrigue<sup>49</sup> believes that OSS could play a major role in providing widespread ICT literacy as well as bringing together gender movements across Africa.

### 5.1.5. ICTs and New, Indigenous Learning Materials

There is no strategic initiative at Dakar University to create ICT-enhanced learning materials. However Computing Centre is supporting some instructional designers, and other emerging "e-learning" champions to work individually, but in parallel, so that a more significant amount of "e-courseware" can be produced fairly quickly. These initiatives are primarily to create awareness of the potential of ICT-enhanced learning materials, hoping to stimulate a new culture in the champions' faculties and departments. University of Saint Louis is peripherally involved, but the hope is that in time they will become co-developers.

Dakar is involved with Cote D'Ivoire in a UNESCO sponsored "e-campus" project, comparing the available ICT "e-learning" platforms, particularly to provide learning material focused on science and technology. It has already become clear that commercial platforms are too expensive in the African context, so the study is concentrating on open source platforms.

Students at Dakar have many complaints about the quality of learning materials provided, identifying this as a major cause of the high rate of drop-outs. They are enthusiastic that multimedia could be used to produce much better learning material. However, they perceived it is unlikely to be driven by the government, because of lack of awareness and funds. Further, most lecturers would not build the new material because they are intimidated by ICTs, generally overworked, undermotivated, and have lost touch with the problems students experience with their material. Conversely, students are keen to learn to build such material. They are not intimidated by ICTs, have fresh experience of the complexities and difficulties with the existing learning material, and are willing to collaborate in producing new material (e.g. a project or Honours thesis).

Universite du Sahel is currently experimenting with web CT for its distance learning courses. They are also using simulations and animations wherever available because of their impact on improving learning. They find multimedia on CD-ROMs (e.g. animations of how a computer works, and how the Internet works) particularly useful because they provide interactivity whilst by-passing bandwidth restrictions. There are plans to encourage staff to develop such CD-ROMs in-house.

Le Reseau Africain de Formation a Distance<sup>50</sup> (RESAFAD) was set up in Dakar by the French Ministry of Foreign Affairs about ten years ago to provide training for teachers, educational administrators, and lecturers by employing electronic media in distance mode. The new CEO ranks highly in the Ministry of Education, is a pedagogist with 15 years' hands-on experience of ICTs, and is breathing fresh life into the organisation. The new success of the initiative is credited, in part, to the CEO's ability to create high level awareness and influence the Minister.

RESAFAD advocates developing capability locally to create locally relevant learning material, rather than importing materials from the developed world<sup>51</sup>. They use a team-based learning material production process,

<sup>49</sup> <http://www.famafrique.org>

<sup>50</sup> [www.sn.resafad.org](http://www.sn.resafad.org)

<sup>51</sup> examples of local products can be viewed at [www.examen.sn](http://www.examen.sn)

with up to 15 team members, and they use of a range of learning material development platforms, both proprietary and OSS, depending on the specific needs of each project. They are setting up similar multimedia centres in all 11 provinces of Senegal, with three experts per centre, so that locally relevant multimedia-based learning material can be established anywhere in Senegal.

RESAFAD is, therefore, attempting to establish a model to be replicated in the other centres as funds are made available from many sources (not the government). The longer-term strategy is that this model can then be promoted throughout francophone Africa via RESAFAD, including Benin, Burkina Fasso, Guinea Conakry, Guinea Equatoriale, Madagascar, Mali, Mauritanie, Togo, as well as Senegal.

### 5.1.6. Collaboration

Dakar is involved in both national and international ICT projects which have impact on the tertiary sector. For example, it is assisting all of Senegal's teacher training centres by providing web site space, and e-mail accounts. It is helping establish the embryo national network for research and education, which continues to be negotiated between all HEIs. The Computing Centre Director is formalizing IPV6 for Senegal. And Dakar is collaborating with the French research and education network in Paris on educational applications of broadband networking, video-streaming, and video-conferencing.

The Universite du Sahel is collaborating with Dakar and other universities by sharing their chemistry laboratories, and anticipate that this need will grow. The president believes that small private tertiary institutions like his are currently unable to collaborate at the national level, since the government only deals with the two public universities. He believes that an African Association of SMALL, young, private universities would be very beneficial for the continent, as discussed at the 2002 conference of the African Association of Universities<sup>52</sup>.

World Links Senegal<sup>53</sup> is negotiating an extension of the normal five-year term with the Senegalese Ministry of Education to extend their work linking schools to the Internet. They would welcome closer ties with the Senegalese tertiary sector, particularly to help create new, multimedia intensive learning materials (involving students as well as pedagogists and technologists, etc.), and to help with piloting, implementing and maintaining new ICTs, e.g. wireless and Open Source Software (OSS).

### 5.1.7. Technology Innovations

Dakar's Computing Centre has established a significant and growing technical capability in OSS, particularly Linux. They are investigating several areas:

- The establishment of reliable, low cost campus PC labs using Linux servers and older PCs as thin clients.
- Sustainable alternatives to existing proprietary technologies (e.g. routers, etc.) which can no longer be afforded.
- The development of user-friendly local language interfaces using Linux.
- The intention is to include Open Source in the Computer Science curriculum by 2004.

Representatives of Senegal's small OSS community complained that the adoption of OSS solutions is far too slow throughout Senegalese society, mostly because of the lack of awareness amongst leaders (public and private sectors) of the potential benefits of OSS. They asked why the HEIs had not taken a "thought leadership" role on this issues, e.g. by producing definitive studies comparing the value of OSS with proprietary software solutions in Senegal's context. They advocated that Senegal urgently needs a centre for OSS, and that the Tertiary sector should drive the establishment of this centre, together with the private and civil sectors, supported by the international donors and development organisations.

Dakar university was impressed by the spread spectrum wireless technology used in the first InfoDev project in 1996 run by the CSIR to provide connectivity to schools and multi-purpose community centres in South

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<sup>52</sup> <http://www.aau.org/english/documents/dakar02.pdf>

<sup>53</sup> [www.world-links.org.sn](http://www.world-links.org.sn)

Africa<sup>54</sup>. Although South African regulations prevented the concept from being developed further there, Dakar's Computing Centre quickly saw the potential of this wireless solution, and customized it to provide higher bandwidth connectivity across Dakars campuses.

## 5.2. Ghana

The author visited Ghana from 01 to 07 February 2003. During that time, he interviewed a wide range of stakeholders, visited Kumasi and held E-Campus Workshop on 07 February 2003 at GIMPA in Accra. Details of the participants are provided in Appendix A.

The main host was Mr Kofi de Heer-Menlah, who provided outstanding organizational support, transported the author to and from Kumasi, and gave valuable advice regarding both ICTs and HEIs in Ghana.

### 5.2.1. Summary of Ghana's Tertiary Sector

Ghana has approximately 16 HEIs, 11 of which are in the capital, Accra. There are three large public universities at Legon (Accra), Kumasi, and Cape Coast, with several teacher training institutions, most of the remaining HEIs being young, private institutions providing only a few specialists or sustainable subjects<sup>55</sup>.

The University of Ghana<sup>56</sup>, Legon, has 14,700 students and 4,000 staff in 13 faculties. Legon was established in 1948 as the University College of the Gold Coast, an affiliate college of the University of London. Following independence in 1957, the university was organised as the University of Ghana and in 1961 began to award its own degrees. The Kwame Nkrumah University of Science and Technology (KNUST) was established as a public tertiary institution in 1963 from a previous college of technology. The main Kumasi campus and the satellite mining campus at Tarkwa have some 2,500 staff and 13,000 students in 13 faculties. The University of Cape Coast, has 7,600 students and 2,200 staff in eight faculties, and was established in 1962.

The author visited Ghana University, spent a day at KNUST in Kumasi, and also spent a day at one of the smaller HEIs, the Ghana Institute of Management and Public Administration<sup>57</sup>. GIMPA was established in 1961 as a single campus public service, civil servant training centre changing to a commercialized public institution in February 2002. It is classified as a tertiary institution, although its status as a university remains unclear. It has about 40 teaching faculty, 90 other staff, and some 1,000 students, mostly on short post-graduate courses of between one day and three years duration, but averaging 1-4 weeks. Its courses are accepted by the Accreditation Board, and its undergraduate degrees are expected to gain accreditation by September 2003.

### 5.2.2. E-Campus: Related National Policy and Strategy Issues

In general, participants emphasised that the development of Ghana's Information Society was multifactoral and complex, facing such problems as the lack of policies at all levels; insufficient funds, either from government or the international community; limited telephone and Internet access; limited electrical power access; and low levels of both ICT specialists and general ICT literacy. They agreed that to date, ICTs for higher education initiatives in Ghana have tended to be fragmented, donor driven, inflexible, and usually departmentally compartmentalized both at the institution and government levels. They believe that the many scattered ICT projects at all levels need to be replaced by integrated, coordinated, and sustainable strategic initiatives.

In particular, Ghana needs more collaboration between tertiary sector institutions, and could, for example, learn from Kenya's experiences with KENET (see below). Ghana's National Council for Tertiary Education is playing an overarching coordination role. Although the Department of Education has set up a centre for distance education, it is struggling to overcome the traditional conservatism of most of the lecturers, and to coordinate activities at the national level.

<sup>54</sup> <http://www.infodev.org/projects/telecommunications/003telematics/finaltad.doc>

<sup>55</sup> <http://elctl.msu.edu/AUP-temp/frameset.php?page=ed-directory.php>

<sup>56</sup> <http://www.ug.edu.gh>

<sup>57</sup> <http://gimpa.edu.gh>

The Ghana Institute of IT (GIIT) is focussing on a range of ICT policy issues, including: Ghana's inadequate telecommunications infrastructure and related regulations; poor Internet access; and the role of OSS. GIIT is also fostering greater awareness of the benefits of ICTs among all sectors of society in Ghana, e.g. via events of the Ghana Journalists Association, involving the Minister of Information and Presidential Affairs; and the presentation in July, 2002 of an ICT Policy paper to the Minister of Communications and Technology.

GIIT is also promoting a high-level ICT Literacy Training programme for computer science students at Legon. The intention is that the local ICT industry would grow and perform much better if more and better quality ICT students were being produced by the local tertiary sector.

### **5.2.3. ICTs and HEI Administration (Including Institutional Policy and Strategy Issues)**

Legon has a history of its ICT systems being set up as separate, stand-alone initiatives. Usually, they have been driven by passionate champions of a particular goal, so broader and longer term organizational issues are given little thought. Recently, an ICT Committee has been established, but its powers are limited, and the data processing centre continues to be free to act in isolation, independently of the ICT Committee.

KNUST had few computers before 1997, and therefore has no legacy mainframe or a long-standing central computing service. Between 1999 and 2002 a significant effort was made to pool and coordinate the growing numbers of scattered PCs for teaching, learning and research. Its distributed ICT systems have evolved as demand will grow and funding would allow. Its ICT structures and processes are currently being reorganized by the University Planning Unit with the full authority of the Vice Chancellor's office. It is handling ICTs at the highest level via an ICT Council Committee, with flexible membership to reflect the ongoing nature of the evolving ICT process. An ICT Policy document is currently being developed. KNUST has found that it is very important to build teams of young, bright, motivated people to drive its ICT initiatives. However, of particular concern is the ongoing shortage of quality teaching staff in the department of Computer Science.

An external ISP is providing KNUST with VSAT Internet connectivity of 1 Mbyte bandwidth for students, staff and even the general public. This initiative is not centrally funded by the University, but has been established with "a business plan intended to provide self-sustainability from the start". Although interest in the Internet was initially stimulated by the AVU initiative, KNUST has moved on to provide a range of more appropriate ICT services, including e-mail, web browsing, online journals, etc.

Although the IT manager at GIMPA reports to the Director General, he is not included in strategic meetings. So GIMPA has not yet decided that ICT should be managed at the highest level. An IT Strategy, written by a technical consultant in March 2002, is long and technically detailed but often not strategically relevant – "it looks like a stereotype document adapted poorly for GIMPA".

GIMPA has an accounting ICT system which has never worked, and several examples of previous procurements where the approach was to buy a specific package rather than acquire an holistic ICT-based solution. GIMPA highlighted an issue commonly experienced in Africa:

*"In part, this problem is created by International Agencies putting pressure on government officials to implement certain processes (often ICT-mediated, e.g. accounting processes). Government then puts pressure on institutions like GIMPA, which usually respond in haste by purchasing an ICT package, but with no advice, guidance or assessment. The International Agency only assesses the impact of its pressure by the highly indirect method of final results. It does not ensure that essential process support is provided to the institutions, e.g. guidelines, purchase, training, improving processes, etc."*

KNUST has an interesting example of in-house application development. An imported package to handle their examination systems proved inadequate. So students and staff collaborated in developing a system to satisfy their needs. The system is working well, and the students, who participated, were rewarded by allowing their contributions to be recognized in their final assessment.

### **5.2.4. ICTs and Access in HEIs (Including Literacy Issues)**

Legon does not have a coordinated strategy yet addressing the ICT literacy needs of its staff or students, let alone the needs of the general public. Legon's computer science department appears to be acting alone on ICT issues. Apart from KNUST, there doesn't appear to be a strategically organized university intervention in this area.



KNUST has developed a 50 PC cluster model in establishing its several PC labs, each cluster having an independent business plan to promote sustainability. This idea was initiated when the Vice Chancellor provided a short-term "start-up" loan to establish self-sustaining PC labs following the drying up of AVU funding. Only 10%–20% of KNUST staff have PCs and are fully ICT literate. However, all students are expected to be ICT literate, having shared PC access via the growing number of PC labs (clusters). Additional 50 PC clusters have been set up in other faculty buildings (e.g. science, the library), and KNUST's strategy is to spread these PC clusters everywhere across its main campus, including residences, and also out into the peri-urban and rural communities.

At GIMPA, all teaching staff have PCs on their desks with Internet access. Non-teaching staff have or will have PCs only where it fits their work role, rather than being seen as a general support tool. All middle management and above are expected to be ICT literate, but only 5 are literate in more than one application since training to date has had disappointing impact. Students have shared access via PC labs, and all courses include ICT literacy modules. ICDL (the International Computer Driving Licence) is being introduced to improve this process. Although the institution is not yet addressing ICT access and literacy issues strategically, individual staff have been working for years on ICTs for development initiatives (e.g. school connectivity and MPCCs).

### 5.2.5. ICTs and New, Indigenous Learning Materials

KNUST does not have a coordinated strategy to develop new learning materials yet. However, some "trail blazers" (e.g. in the science and engineering faculties) are experimenting on an ad hoc basis. Most locals believe it is cheaper to import learning materials than to develop locally. But those with some e-learning experience believe that the appropriateness of imported materials for local needs should be investigated much more thoroughly, so that the best balance of local and imported content can be based on more than costs. Ideally, it would be best to harmonise existing programmes from several universities by collaborating with locally build appropriate new e-learning materials. But "the barriers need to come down first".

GIMPA is moving strategically into both correspondence and electronic distance education, initially by making text material available electronically. However, the ICT manager is establishing a new centre to emphasize the production and use of multimedia-based e-learning materials.

Participants suggested that for "e-campus" to become a national reality in Ghana, several ICT-related initiatives would need to be implemented in parallel. Compatible, standardized electronic administration systems should be implemented in all tertiary institutions running over compatible, broad bandwidth infrastructure shared wherever possible. E-learning materials and processes should become integral components of residential HEI courses, and many more learners should be reached via electronic community learning centres in the most remote or disadvantaged areas, in collaboration with existing school connectivity and MPCC initiatives. A national capability, involving the combined efforts of the tertiary sector, needs to be established to develop a wide range of interactive, multimedia based e-learning materials (much more than simply making digitised print material available online). They promoted the argument that CD-ROMs represent the immediate technology of choice allowing such capability to be developed quickly, and to have immediate, widespread impact.

### 5.2.6. Collaboration

KNUST's flexible, evolving approach to its organisational ICT strategy is allowing good ICT collaboration to develop between departments and faculties. However, significant barriers are still being experienced in attempts to collaborate with other institutions (both tertiary, and other, e.g. school connectivity initiatives).

KNUST wishes to extend its pathfinding role in ICT outreach projects. It would like to encourage other universities to become involved in collaborative projects. However, there is significant concern that when such initiatives achieve national status, they become bogged down in bureaucratic processes and political complexity.

The IDRC's Acacia programme in Ghana is funding a "Train the Trainers" ICT project, hoping for a multiplier effect in the impact of ICTs in education. However, experience in Ghana emphasizes that this initiative should NOT be focussed on training older teachers, who generally struggle to become proficient enough to use ICTs, let alone teach them. Instead, ICT training should be focussed in teacher training colleges, where young potential teachers adopt ICTs much more readily, with particular focus on trainee science teachers.

The issue of teachers (especially older teachers) acting as a bottleneck in disseminating ICT skills to the young, rather than providing a multiplier effect, needs to be investigated further.



Although KNUST's involvement with the AVU has stimulated interest in ICTs in general, and the Internet in particular, they have increasingly experienced problems with the AVU's programmes and management similar to those expressed in meetings with colleagues from the East African countries also involved with the AVU. A particular concern is that KNUST is forced to pay the AVU for video, audio, and print materials produced in the USA that are proving ineffective for their students in Kumasi.

Generally, the participants emphasised that a wide range of ICTs are available to HEIs (e.g. telephones; mobile devices; radio; TV; video; computer networks; the Internet; video- and tele-conferencing; electronic presentation systems; CD-ROMs; and print material), but that their potential has not yet been strategically tapped in Ghana, whether for access, administration, or new learning materials. They suggested several areas for potential HEI collaboration at the national level, including a shared fibre-optic network; a national electronic registration system; a country-wide virtual library system; and a growing national network of electronic distance learning centres.

### 5.2.7. Technology Innovations

Ghana has a growing OSS community, with OSS being featured regularly on national radio. There has been a Ghanaian Linux Users Group<sup>58</sup> for several years, and it is working through Ghanaian universities (initially at Legon) to spread awareness of OSS generally, and Linux in particular, via hands-on training (e.g. Linux installation).

## 5.3. Ethiopia

The author visited Ethiopia from 10 to 13 February 2003. During that time, he interviewed several relevant champions, and held E-Campus Workshop on 12 February 2003 in the UNFPA Conference Room, at the UNECA complex in Addis Ababa. A full list of the participants is provided in Appendix A.

The main host was Mr Yared Kiflom, who provided translation services, outstanding organisational support, as well as valuable advice regarding both ICTs and HEIs in Ethiopia.

### 5.3.1. Summary of Ethiopian Tertiary Sector

Ethiopia has approximately 28 HEIs, seven of which are in the capital, Addis Ababa, and the rest spread across at least other 11 main centres. Addis Ababa University<sup>59</sup> (AAU) is the parent public HEI, but four further public institutions were created in 1992/3 when regional colleges at Bahir Dar, Debu, Jimma, and Mekelle were given independence from AAU. There are several teacher training institutions, and most of the remaining HEIs are young, private institutions providing only a few specialists or sustainable subjects<sup>60</sup>. Unfortunately, Ethiopia's HEIs are only able to enrol less than 3% of the 150,000 students who pass the ESLCE (Ethiopian School Leaving Certificate Examination) each year.

The author's stay in Ethiopia was very short, leaving time only to visit one institution, AAU. It has 10,300 students with a staff of 825 in 11 faculties. It teaches in English and was established in 1961.

### 5.3.2. E-Campus: Related National Policy and Strategy Issues

Although the Ethiopian government has begun to address the development of Ethiopia's Information Society, participants believed that a great deal more needs to be done, including an Information Society Policy for Ethiopia, and particularly addressing the role(s) of ICTs in education. Concern was voiced that "most people in leadership positions are aware of the importance of ICTs, but are not well enough informed to know

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<sup>58</sup> [www.linuxinghana.net](http://www.linuxinghana.net)

<sup>59</sup> [http://www.abysiniacybergateway.net/ethiopia/aau\\_home.html](http://www.abysiniacybergateway.net/ethiopia/aau_home.html)

<sup>60</sup> <http://elctl.msu.edu/AUP-temp/frameset.php?page=ed-directory.php>

specifically what to do". Ethiopia is currently finalising a National ICT Policy document<sup>61</sup>, but there are concerns regarding its comprehensiveness, and the transparency of the processes used in its creation.

The public sector has embarked on "e-government" projects in response to the National ICT Policy, which focuses on implementing projects in e-education, e-health and e-government. The government's strong decentralization drive is expected to motivate for the widespread use of ICTs at district levels. However, the government is not perceived to be addressing the crucial need to create an enabling environment for the private sector to contribute to these national initiatives, by e.g. opening up the ISP environment; liberalizing the telecommunication sector; creating ICT "incubation hubs", etc.

As yet, there is no specific policy regarding the role(s) of ICTs in education in general, and the tertiary sector in particular, although there is a growing emphasis on the potential benefits of distance education. However, a HE task force recently has been set up by the Ministry of Education to investigate the development of a national ICT strategy for education.

Ethiopia's telecommunications infrastructure is viewed as being seriously inadequate, with access issues being neglected. This is seen to be restricting a wide range of potential ICT initiatives to improve education, particularly for the most remote and poorest communities which, arguably, have the greatest education needs. There are concerns that the Ethiopian Telecommunications Corporation's (ETC's) monopoly status is causing poor service, particularly the inadequate response to education needs. However, the academic and research network infrastructure linking all Ethiopia's public HEIs is being established. But the policy does not allow private tertiary institutions to be included, nor does it address the potential benefits of wireless. Apparently, the government is still working on its earlier promise to allow VSAT with 78 Mbps bandwidth to be made available for distance education. The shortage of ICT experts in Ethiopia is having the inevitable result that crucial people, who have been driving the tertiary infrastructure development initiatives, have been lured into the private sector.

There was a substantial debate regarding funding models for education, and the role of governments, which raised the following questions:

- Does the "commodotization" of Education (e.g. the WTO's ruling that universities may compete freely worldwide) enhance or hinder UNESCO's drive for "Education for All"?
- Should education systems be based on the concept that "knowledge can be owned, and must be purchased", or that "knowledge is a global good that should be freely available and easily accessible"?
- What proportion of Ethiopia's future distance education expenditure (both running costs and investment in development) should be borne by: government; the various categories of learners; the private sector; international agencies; and others?

### **5.3.3. ICTs and HEI Administration (Including Institutional Policy and Strategy Issues)**

As yet, there is limited guidance and support at the national level to encourage Ethiopian HEIs to develop and implement appropriate ICT policies and strategies. This is compounded by the inadequate national infrastructure and the poor service provided by the monopoly ETC. Hence the HEIs have mostly been addressing their immediate ICT needs in an ad hoc fashion, usually at (or below) the departmental level.

Historically, in most Ethiopian HEIs, ICT tends to be managed in an ad hoc manner, often by the person who is responsible for corporate information management. However, some institutions have recently experimented with the provision of centralised ICT services. AAU recently set up an ICT Development Officer position on the University's Executive to facilitate, integrate, and coordinate all the university's strategic ICT activities. Initially, Unity University's experimental ICT department generated a widespread "them and us" perception, its services were unpopular and its first institutional ICT policy document was ignored. To change this negative perception, ICT steering committee was established with representatives from the highest level. An alternative process is underway, starting with a vision of the potential benefits of ICTs (at various levels), and resulting in a new ICT policy seen to be "of relevance" throughout the institution.

<sup>61</sup> [www.telecom.net.et/~estc](http://www.telecom.net.et/~estc)

Unity University is currently trying to upgrade its facilities by extending its inter-campus network. However, the project has been stalled for over six months because the new hardware (routers) has been held up at Addis Ababa International Airport. No official reason has been provided. Apparently, the authorities fear that these routers will be used to provide VOIP (voice over IP), in breach of the current regulations, and threatening the monopoly ETC's telephony revenues. This is an example of longer-term wide-ranging benefits which cannot be quantified (potential growth and development caused both by better education for more students, and better technology solutions) being sacrificed for short-term benefits which can be quantified (Telecom's revenues)! Similar issues repeatedly surface throughout Africa, and need to be addressed holistically and with authority at the global level – a role for UNESCO?

The chronic shortage of sufficient people with the necessary range of ICT expertise was repeatedly mentioned as a major problem, which is frequently exacerbated by the poaching of the HEI's administrative ICT staff by the private sector.

#### 5.3.4. ICTs and Access to HEIs (Including Literacy Issues)

At AAU only some academic and administrative staff have PCs, whilst the students have limited access to PCs (not all networked) via library facilities. Only the Computer Science and Engineering students are provided with PC laboratories. The dominant application for staff is e-mail, and very little learning material is being provided for students via the university's networks or the Internet. Currently, ICT literacy is only included in the curricula of a small subset of AAU students where ICT is an integral component of the course. But the intention is to move to universal ICT literacy for both students (including trainee teachers) and staff. Other Ethiopian public sector universities are following AAU's lead, but are even further behind.

By contrast, Unity University is already providing ICT literacy courses to all its students. They have 500 PCs to serve their ~ 10,000 students (a "reasonable" 1/20 ratio) via PC laboratories. These PC labs are available to all students when not being used for dedicated classes, and are also open to the general public after hours (but at fairly expensive rates by Ethiopian standards).

Access to the PCs by the wider society, albeit mostly in the main centres, has increased considerably following the availability of cheap PC "clones" in the Ethiopian market. The government is promoting ICT access and literacy for the general public via several initiatives, including the promotion of school and community centre connectivity (particularly via VSAT), and the stimulation of vocational ICT training at high schools. However, a key barrier to access remains the slowness with which the ETC rolls out ICT infrastructure to the remote and rural areas of Ethiopia.

Generally, Ethiopia's HEIs are not involved in a coordinated initiative yet to provide the general public with access to PCs and the Internet, to ICT literacy courses, or to other ICT services, particularly in the poorest communities. However, participants hope that the current drive to develop a wide range of distance education services to provide "education for all" in Ethiopia will inevitably lead to strong tertiary involvement.

#### 5.3.5. ICTs and New, Indigenous Learning Materials

Print remains the dominant technique of distance learning in Ethiopia, although audio-visual technology has been used for some time, and the Internet, CD-ROMs and other ICTs are being investigated.

There is a growing realisation that some specific local language- and culture-based learning materials are needed in Ethiopia, but that there is little indigenous capacity or capability yet to produce this. The government has asked the AAU to initiate a process to build this local capability, whilst the EMA (Educational Media Authority) is also working on providing such material for local radio, print, and even some initial TV broadcasts.

A stimulating debate is evolving in Ethiopia around the most appropriate sources of a wide range of new learning materials. Which should be *imported* "as is"; which should be imported, but *adapted or customized* to satisfy local needs; which should be fully *produced locally*; and, in each case, why?

- There are serious concerns about this new, multimedia based manifestation of the historical dependence on *imported learning materials*. Yet this is countered by the fear of wasting rare local resources and time on "reinventing wheels", as well as recognizing that imported materials can be very useful for awareness creation, and that some are appropriate "as is" for certain Ethiopian learners.

- Initially, *adapting or customizing* imported materials seems the most attractive “middle road”, especially whilst trying to establish an indigenous capability. However, there are problems with what degrees of local adaptation (if any) are allowed by the producers (usually from the developed world), and for how long. Additionally, it was recognized that producing local material *de novo* is a very different process from adaptation, i.e. adaptation does not linearly lead to developing a sustainable indigenous production capability.
- Little is known to date in Ethiopia about many issues associated with the *indigenous production* of new learning materials, and many people, including some in leadership positions, do not recognize the importance of this capability. To stimulate awareness and debate, demonstrations are needed in the short term of locally produced multimedia-based materials. Hopefully, as the debate develops, the indigenous capability will develop in a positive feedback loop. Throughout, pedagogists need to maintain the emphasis on improvements to the quality of learning, rather than using the latest ICTs; and to clarify the optimal balance between imported materials and indigenous production, both in the short and longer terms.

### 5.3.6. Collaboration

Universities in most African countries, including Ethiopia, have little power compared with their counterparts in the USA and Europe, since their governments see them as “hot beds of opposition”. Yet if Africa’s HEIs are to fulfil their potential contribution to Africa’s development, and especially “Education for All”, this gulf must be bridged. African HEIs and governments must become partners. The perception of governments (and other stakeholders) is that the HEIs have not done enough to address national and regional imperatives. They are seldom seen to communicate their ideas in a way that governments can use. Generally, they are not playing the sorely needed thought leadership role.

In the larger, public HEIs, isolated ICT initiatives are often found within different departments, rather than strategic institutional ICT initiatives.

Collaboration between all of Ethiopia’s public universities is encouraged by their close relationships, since until fairly recently they were all regional components of the one tertiary institution, the AAU. The Presidents have initiated a process of strategic collaboration with the support of the Ministry of Education. However, the centralized national planning of ICTs in higher education appears to be hindering collaboration between HEIs (and schools) at regional, provincial and local levels.

Ethiopia’s HEIs could do much more to develop strategic partnerships with the international community, especially since so many institutions are well represented in Addis Ababa, e.g. UNECA, UNDP, UNESCO, etc. NORAD has pledged \$2.5 million per year for ten years to AAU for initiatives utilizing ICTs to improve education, with a particular focus on “appropriate distance education”. The Association of African Universities could be used as a platform to stimulate ICT for improved education initiatives both in Ethiopia and across Africa.

The African Virtual University (AVU) has succeeded in stimulating interest and creating awareness in the potential role of ICTs in education. However, Ethiopian experience with the AVU has been mixed, with concerns regarding appropriate technologies (why the emphasis on video conferencing?), and with the need for the inclusion of more local expertise, both as lecturers and ICT professionals. From an Ethiopian viewpoint, the AVU’s Committee of Vice Chancellors does not appear to be close enough to these and other issues.

The UNDP is supporting government distribution of PCs to schools in Ethiopia, and WorldLinks is involved in similar initiatives. However, to date there is little involvement of Ethiopian HEIs, especially of a strategic or thought leadership nature.

Participants emphasized the need for standardization of tertiary education both within Ethiopia (and other African countries), as well as across the continent. The lack of standards for ICT qualifications in Ethiopia, for example, needs to be addressed via an independent accreditation body. Indeed, Africa-wide accreditation mechanisms are needed not only for ICTs, but for most other disciplines.

### 5.3.7. Technology Innovations

There was a recurring theme throughout both interviews and the workshop that there are no incentives from the government or private sector in Ethiopia to encourage innovative initiatives (including ICT innovations) either

by universities or by individual academics. The perception is that to attempt to innovate in Ethiopia today “is more trouble than its worth”.

Awareness of the potential benefits of OSS is low in Ethiopia, and there is a severe shortage of quality OSS expertise. For example, AAU is currently investigating the extension of its ICT infrastructure via servers and thin client technology based on a “proprietary” unix solution. OSS alternatives (e.g. Linux, BSD, etc.) do not appear to have been considered. However, Linux has been adopted with excellent results in at least one of Ethiopia’s private universities. Although proprietary software solutions will continue to dominate many areas of ICT implementation, Ethiopia (and particularly the HEIs) need to understand the issues around “buy or build”. Throughout Africa there is a growing demand for locally produced software to satisfy local needs that are either not adequately addressed by proprietary software, or cannot be afforded. Addressing these needs where appropriate could have the added benefit of stimulating the development of a viable indigenous ICT industry.

## 5.4. Kenya

The author visited Kenya from 20 to 23 February 2003. During that time he interviewed people, and held E-Campus Workshop on 21 February 2003 at the UNESCO Offices in the UN compound in Nairobi. Details of the participants are provided in Appendix A.

The main host was Mr Hezekiel Dlamini, who provided transport, outstanding organisational support, as well as valuable advice regarding both ICTs and HEIs in Kenya.

### 5.4.1. Summary of Kenyan Tertiary Sector

Kenya has approximately 37 HEIs, six of which are public universities. Beyond the teacher training colleges, there are at least 14 private universities, most of which are very recent, with new entrants and several closures making their numbers very fluid.

Nairobi University<sup>62</sup> was established in 1956. It has approximately 12,000 students and 5,700 staff, 1,500 of which are academics from 29 faculties. In 1967 it initiated correspondence-based distance education for extramural studies. This has now grown to over 10,000 off-campus students, mostly studying education, but with significant growth in business students. Jomo Kenyatta University<sup>63</sup> (JKU) was established in 1981, has about 4,000 students and a staff of 1000 in ten faculties.

The author visited Nairobi University and JKU, as well as the United States International University<sup>64</sup> (USIU), a medium sized private university on the outskirts of Nairobi. Established in 1969, USIU has some 4,000 students and 40 full-time teaching staff, 60% having Ph.Ds., and it enjoys dual accreditation from the Western Association of Schools and Colleges, in USA and the Government of Kenya. Its degrees are recognized internationally.

### 5.4.2. E-Campus: Related National Policy and Strategy Issues

Kenya does not have either an authorised National ICT Policy or an Information Society Policy yet. Although a draft National ICT Policy apparently has been produced, it has not involved or been circulated to many major stakeholders, leading to concerns that the process has been non-inclusive, and threatening its legitimacy. The Kenyan Information Society (KIS) promoted the idea of a Chief Information Officer (CIO) at the highest level of government. An initial attempt to employ a World Bank funded IT specialist in such a role was not well received. However, an IT Sector Working Group has been set up as one of the eight groups required to respond to the eight major issues identified in the World Bank’s Poverty Reduction Strategy Paper. “National e-Readiness” study, funded by InfoDev, has been carried out and accepted by government, but has not been widely disseminated yet.

As yet, there are no clear signs of a coordinated, national ICTs in education policy or strategy. However, the widespread optimism created by the election of the new government includes hopes that the strategic

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<sup>62</sup> <http://www.uonbi.ac.ke>

<sup>63</sup> <http://www.jkuat.ac.ke>

<sup>64</sup> <http://www.usiu.ac.ke>



importance of ICTs, especially in education, will be recognized, and that the Minister of Education, Science and Technology may be established as the National ICT Champion.

### 5.4.3. ICTs and HEI Administration (Includes Institutional Policy and Strategy Issues)

At Nairobi University the IT coordinator is at executive level, reporting directly to the Vice Chancellor. This status is thought to be essential for ICT to play the needed strategic role in the future development of the institution and the Kenyan HEI sector in general. As ICT literacy is spreading through the campus, the previously centralized ICT strategy and policy development processes are becoming distributed, more transparent and inclusive, and more responsive to emerging needs. The concept of ICT champions has been adopted for every faculty and department to identify and channel these needs into the ICT strategic and policy processes. This, in turn, has led to a much clearer distinction between the requirements and priorities of the academic use of ICTs compared with their administrative use. Major goals include a PC on every staff member's desk by 2005 and the automation of all administration functions by 2007.

Nairobi University has had a mainframe since the 1960s, and has developed a tradition of building "in-house" all its administration systems (except accounting). For the past few years, 20 or so professional ICT staff, most of whom were former students, have stayed despite the uncompetitive salaries because the environment is so challenging. However, retaining ICT staff is becoming a crisis, so innovative models are being investigated, e.g. the University of Dar-es-Salaam which has formed a separate ICT company. It is believed that this in-house capability has maintained the institution's independence from the common multinational applications, and their crippling expenses, which has benefitted the university's long-term financial position.

At USIU, ICTs are being used at excellent levels of "efficiency and effectiveness". USIU is a small private university in Nairobi with some 4,000 students. Their excellent ICT administrative practices enable them to keep their administrative staff to a minimum, yet the quality of their education and facilities is among the best in Kenya. There is a concern that if they grow beyond the 5,000 student level, many of these ICT-based benefits will be significantly reduced.

**KENET**<sup>65</sup>, the Kenyan Education Network, presents a case history of particular importance to this study:

*"KENET was started with an aim to establish sustainable communication and networking among educational institutions in Kenya that facilitates wide use of Internet technology in teaching, research and sharing of other information resources to the general populace at affordable cost."*

It now provides three main educational services, i.e. content integration; network management; and web solutions, over a shared Internet infrastructure. It was brought about by a few dedicated visionary educationalists, eventually sustained by an unusual level of interdependent collaboration by Kenya's HEIs. But the history of its development, only briefly summarized here, includes a wealth of valuable lessons for anyone seriously considering the development of an African e-campus.

KENET was formally established in 1999, but its seeds were sewn with the need for Internet infrastructure for education first expressed via dial-up systems in Jomo Kenyatta University in 1995. A network of enlightened people collaborated voluntarily for years, with some initial support from USAID's Leland initiative, but "finding closed doors everywhere". Eventually, KENET was formed, involving over 70 institutions and several committees working on major issues, e.g. action plan; regulations; infrastructure; content; plus a special library group. KENET was established without any direct donor funding. Instead, the collaborating institutions saw enough areas of mutual benefit to act alone. A very important message.

Importantly, KENET's Action Plan goes beyond the tertiary sector, and includes creating connectivity for secondary and primary schools. Despite an MOU with Telkom (Telkom Kenya Ltd) agreeing to a 50% tariff for educational connectivity, the monopoly's emphasis that it should profit from the initiative forced KENET to look for an alternative. KENET negotiated a licence with the Communications Commission of Kenya<sup>66</sup> (CCK), thereby becoming a private network and avoiding Telkom's high costs.

<sup>65</sup> <http://www.kenet.org/#>

<sup>66</sup> <http://www.cck.go.ke>



CCK has been supportive in several ways: providing two years' funding for the KENET secretariat; freeing up wavelengths specifically for KENET, providing licences free of charge for at least two years; and agreeing to an MOU with KENET on "Internet for education". In principal, this frees KENET to address the needs of all education sectors, and meetings have recently been held with Kenya SchoolNet and similar organizations to collaborate on providing this broader service.

KENET is now a well established not-for-profit Trust, with the trustees being the Vice Chancellors of three public and three private Universities. The CEOs of Telkom and CCK are on the board of trustees. Sustainability and independence are being addressed by membership and subscription fees, as well as some reserves that have been saved. Leland is now providing \$300,000, used not for the secretariat, but for connectivity. A further \$500,000 has been added for infrastructure, \$120,000 for content development, and \$180,000 for training.

#### **5.4.4. ICTs and Access in HEIs (Including Literacy Issues)**

In general, Kenya's six public universities lack sufficient network infrastructure and PC laboratories to provide most staff or students with adequate access. Jomo Kenyatta University, for example, is trying to expand its PC lab facilities by both increasing their numbers and size. But set up and running costs are proving prohibitive, compounded by the omnipresent problem of inadequate bandwidth. Hence, although there is general recognition in these institutions of the need for universal ICT literacy for all students and staff, the literacy courses, that have been established, are not having significant impact yet.

Although each of Nairobi University's campuses has several PC labs, the numbers are far from adequate to satisfy demand. The goal is to reach a PC to student ratio of 1-10 within the next three years, and providing PC labs in residences will be part of this process.

The importance of universal ICT literacy was brought to the fore at Nairobi University by first addressing the ICT literacy (or the lack thereof) of the university's executive management. It is still not the strategy that ALL staff and students must be ICT literate because of the inadequate capacity to train large numbers (both the lack of PC labs, and quality ICT instructors). But this will be the new policy by the end of 2003. Using e-learning material like the ICDL is seen as the way to solve the ICT literacy problem. The university is investigating the idea of inviting entrepreneurs to run the PC labs and ICT literacy courses rather than retain them as in-house services.

A special case is the Kenya Technical Teachers College (KTTC), which established literacy courses for ALL its students and staff in early 2002. The recognition of the need for general ICT literacy was stimulated by the discovery that the ability and desire of their students to use the Internet (from all disciplines, not just Computer Science) was generally much greater than among KTTC's teaching staff. Hence there is an initiative at KTTC to move beyond ICT literacy and to involve the use of PCs and the Internet in teaching ALL subjects. Although many of the teaching staff initially resisted, this initiative is now changing the institutional attitude and culture toward the growing role of ICTs in all aspects of teaching and learning. The costs of setting up and running the extensive PC lab facilities needed for this initiative are being reduced by opening them up to the paying public as cyber-cafes after hours and at weekends.

In several of Kenya's private HEIs, access to PCs and the Internet, as well as the drive for universal ICT literacy are more advanced than the usually much larger public HEIs. At the USIU for example, universal ICT literacy and PC access has been established for some time. Interestingly, the newest PCs go to their 4,000 students, not to the staff.

To date, there is no national policy or initiative to promote ICT literacy throughout Kenyan society, including the poorest communities. The participants recognized that although the HEIs were not yet playing a central role in promoting universal ICT literacy into the rest of society, they should be doing so, since they arguably have the best capability. For example, HEIs are beginning to address societal ICT literacy by collaborating closely with Kenya SchoolNet, which was recently launched by the Kenyan Information Society<sup>67</sup> (KIS). The opportunity was mentioned of further strategic HEI collaboration with KENET, KIE, and other national initiatives.

In a special initiative, JKU is providing the syllabus and assessment for innovative courses aimed at the development of ICT skilled people all over Kenya in collaboration with existing institutions. These courses

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<sup>67</sup> <http://www.uneca.org/aisi/nici/Kenya/kenya.htm>

progress from certificates, through a diploma, then a degree, and even to higher qualifications. Previous rules of prior learning are being made much more flexible to encourage and prevent the exclusion of disadvantaged people. 3,000 students are now in the programme, many of who having failed maths but nevertheless are progressing well.

Some participants mentioned similar interesting findings from their experiences in using ICTs to promote all forms of literacy (including ICTs). They found that, in general, young people (including pre-teens) assimilate to PCs and become ICT literate very much faster than adult trainees. Indeed, the best of these youngsters can extract significant value out of even the oldest machines by investigating their inner workings rather than simply using them to run the usual applications. In some cases, this experience has led to "reverse mentoring", where ICT literate students help with the learning of ICT illiterate teachers! However, this needs to be handled with sensitivity, since only some teachers (usually highly motivated) are comfortable with this reversal of roles.

#### 5.4.5. ICTs and New, Indigenous Learning Materials

Nairobi University has identified "enthusiastic staff members", and is training them to develop basic e-learning courseware in order to generate momentum throughout the institution. Initially, they are exposing these champions to the power of the electronic media by converting their current material to web delivery. Adapting their pedagogy to the full power of interactive multimedia will come later. They are using an e-learning ICT platform that has been developed in-house. The goal is to move to the point where the majority of students are able to adopt technology-enhanced learning methods.

As yet, there is no national initiative to promote the development of ICT enhanced indigenous learning materials, including for and by the Kenyan tertiary sector. In some important subject areas, it was argued that imported learning materials (usually from the English-speaking developed world) are working well, e.g. Java courses, and others in the ICT discipline. However, there are many subject areas where this is not the case, and where locally produced (or customized) materials are preferable or even essential. Outside the tertiary sector, such local production is likely to lead to problems both over intellectual property (IP), and the need for government approval to create and use material in most other education sectors. However, lecturers in the tertiary sector have a history of producing their own material, which strengthens the case for the tertiary sector to play a major role in establishing such a national capability.

It was suggested that a collaborative project to develop some ICT enhanced Kenyan learning material(s) that would demonstrate their value should be initiated as soon as possible. Material that is both culture- and language-sensitive was discussed, hence a Swahili material initiative was thought to be an excellent starting point.

#### 5.4.6. Collaboration

There are few examples involving several Kenyan HEIs of collaboration on national initiatives developing ICTs for education, with the notable exception of KENET.

At the institutional level, internal procurement processes are seen to obstruct collaborative ICT initiatives. In order to reach more potential students, Nairobi University is developing a model of franchising distance education courses to be managed by private sector entrepreneurs.

There is believed to be a major opportunity in the local development of administrative ICT systems to be shared by all Kenyan public HEIs. Nairobi University has made this case by successfully developing Kenya's national HEI admission system.

At the international level, Inter University Council of East Africa (IUCEA) is attempting to establish collaborative processes and projects with the Vice Chancellors of both public and private HEIs throughout East Africa. However, there is not an equivalent body within Kenya. The wastefulness of this lack of collaboration has become obvious to the international donor community which, according to the IDRC, is encouraging international collaboration focussed on ICTs in education (e.g. the Partnership to Strengthen African Universities<sup>68</sup>).

<sup>68</sup> <http://www.carnegie.org/sub/news/partnership.html>

#### 5.4.7. Technology Innovations

“Technology Dumping” involving ICTs is not a simple issue – there can be major benefits of utilising ageing hardware (rather than software), as well as serious problems. Kenyan authorities refuse to allow out-of-date PCs (and other ICT equipment) to be imported into the country because of the long history of inappropriate or outmoded technologies being dumped throughout Africa by a variety of players from the developed world. However, there are now important ways that “dumping” can be partially reversed, at least, in the case of ICTs. For example, old PCs can be used by young ICT enthusiasts for experimentation, or even more widely as thin clients for Linux-based systems (a particularly inexpensive way of proliferating top quality networked PC laboratories and cyber-cafes). It was strongly endorsed that this issue needs a “thought leadership” paper as soon as possible.

The general view of participants was that the current circumstances, policies and regulations in Kenya make it extremely difficult to experiment with, let alone implement, new technologies, including ICTs. For example, KENET, which is a private licensed network, is following global trends in wanting to take advantage of wireless technologies. Although they are working closely with the regulatory body, the Communications Commission of Kenya (CCK), ongoing problems with the allocation of licenses continue to delay progress. In another example, KTTC has established a wireless connection from Geopath, via Jumbonet (which holds the national monopoly). Although the technology provides 3 mbps of bandwidth, Jumbonet only allows the KTTC to use 384 kbps.

Kenya’s tertiary sector exhibits little strategic awareness of these important issues, or of the negative impact they are having on significant potential improvements to the quality and reach of the nation’s education facilities. It was recommended that, in the immediate future, the HEIs should collaborate with representatives of the private sector (which believes that these problems are severely inhibiting growth of the economy) in a series of initiatives to engage with government in resolving these and related problems in the short and longer terms.

Nairobi University realises the major potential benefits of OSS since they have several staff with the appropriate technical expertise, and have estimated the short-and longer-term cost savings. However, the development of an organizational migration strategy is proving problematic, particularly concerning the in-house developed applications. At the national level, OSS has become an integral component of KENET. It was suggested that a local task team to investigate and promote the appropriate use of OSS would be of significant value in Kenya, and that KIS and KENET should collaborate to promote this.

Nairobi University is taking advantage of the new KENET regulations (which provide for licences to establish private networks) to innovate with wireless technology to provide high bandwidth interconnectivity across the campus.

### 5.5. Uganda

The author visited Uganda from 23 to 26 February 2003. During that time, he interviewed a range of stakeholders, and held E-Campus Workshop on 25 February 2003 at the UNESCO National Commission Offices in Kampala. Details of the participants are provided in Appendix A.

The main host was Mr Michael Kityo-Galiwango, who kindly transported the author to and from Jinja, and provided outstanding organisational support, as well as valuable advice regarding both ICTs and HEIs in Uganda.

#### 5.5.1. Summary of Ugandan Tertiary Sector

Uganda has approximately 16 HEIs, seven of which are in or near the capital, Kampala. In addition to several teacher training colleges, there are several small, young, private universities. Tertiary enrolments have grown from about 5,000 in the 1970s to over 50,000 in 2001, but the gross enrolment rate is less than 3%, low even for Sub-Saharan Africa.

Makarere University<sup>69</sup> in Kampala was established in 1922, and now has about 9,000 students and 750 staff in 18 faculties. Uganda Martyrs University<sup>70</sup> is a private HEI established in 1993 in Nkozi. It has nearly 1,000 students on full-time, part-time, and distance-learning programmes, with 20 staff in 6 faculties.

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<sup>69</sup> <http://www.muk.ac.ug>

<sup>70</sup> <http://www.fiuc.org/umu>

The author made a half-day visit to Makerere University, and spent a day visiting the much more remote Namasagali University at Jinja. Namasagali University was established in Jinja in 1985, and is, therefore, the oldest private university in Uganda. It is needed to satisfy the demand from local students not able to gain access to Makerere. It is small, with under 300 students and 20 staff in three faculties.

### 5.5.2. E-Campus: Related National Policy and Strategy Issues

Uganda has recently established a variety of ICT-related national policy initiatives (e.g. "Uganda's National Information Infrastructure Agenda (NIIA) Summary Report"<sup>71</sup>, funded by InfoDev). The ICT policy produced by the National ICT Policy Committee is about to be adopted by government. Since this body falls under the Minister of Works, it seems, therefore, that he is the de facto national, high-level ICT Champion.

The Ugandan National Council of Science and Technology has been investigating current national policies, including their ICT component. This led, in May 2002, to a Senior Information Scientist at the Ministry of Education and Sports delivering the Ministry's Draft Policy for ICT in the Education Sector, which was due to be adopted in April 2003. He has excellent ICT qualifications, with particular interests in simulations, statistics and OSS. The draft policy states:

*"The ICT policy in the education sector therefore, has to play a critical role in rationalizing and harmonizing ICT related activities/programmes within the sector which are, hitherto, uncoordinated and fragmented. Streamlining and mainstreaming of these activities is of prime importance." And "the fundamentals underlying the transformation ... to a 'knowledge-based society' are in investing in ICT in education right from primary to tertiary levels. ICT programmes have been initiated at secondary and tertiary institution level, though on a much-limited scale compared to the demand for such services."*

In addition, the National Council of Higher Education (NCHE) has recently been established. The participants advocated that, in collaboration with the Inter-University Council for East Africa, the NCHE should take responsibility to promote and implement the wide range of ICTs in Education initiatives needed urgently both in Uganda and throughout Africa.

Earlier this year, the Ugandan Vice Chancellors Association has formally adopted a project proposed by Makerere University to establish a Ugandan HEI network, including both public and private tertiary organizations. Some suggest that the national regulatory body, which is being reconstituted at the moment, is the best mechanism for driving a coordinated approach to shared HEI infrastructure. Others advocate that Uganda might find value in investigating and learning some important lessons from the establishment of KENET, the successful Kenyan HEI infrastructure initiative described above.

A serious concern was voiced for the apparent lack of any "Professional Ethic" within Uganda's small ICT industry. The perception is that the ICT market is dominated by providers who distribute poor quality or inappropriate hardware and software, and who frequently indulge in bribery and other corrupt practices. It was suggested that a standardization and coordination body (perhaps involving the Bureau of Standards) was needed urgently to help establish a professional ethic.

### 5.5.3. ICTs and HEI Administration (Including Institutional Policy and Strategy Issues)

Most Ugandan HEIs (both public and private) do not have comprehensive institutional ICT policies and strategies (with the exception of Makerere). The participants believe that they should be developed in the near future, aligned with the relevant national policies and strategies. In the larger HEIs (e.g. Makerere) there is an ICT Executive at the highest level, e.g. the Vice Chancellor's office. In the smaller (often private) HEIs, a different, flexible model is evolving, starting with an ICT Committee made up of a range of institutional stakeholders. Centralized computing services are developing in most HEIs, but a major discussion point was that ICTs are cross-cutting technologies, so it is important to recognise and consult all the people who may be involved, both at the strategic and implementation levels.

Most Ugandan Universities are young, so ICT expertise, particularly with experience in ICT application in HEIs, is very rare. Participants suggested that Uganda should develop guidelines on how to establish and manage ICTs, especially at young, growing HEIs.

<sup>71</sup> [http://www.makere.ac.ug/ics\\_diiiaup](http://www.makere.ac.ug/ics_diiiaup)

60% of Makerere's recurrent ICT budget is spent on access issues (and this percentage appears destined to grow in future), leaving little funding for major new ICT initiatives within or beyond the University. Participants believe that most large HEIs are locked into this cycle. Innovative approaches are needed to break this downward spiral, e.g. Makerere is planning to provide commercial ICT services to the market (particularly in Kampala) within 18 months.

At Namasagali, ICT infrastructure is almost non-existent with only one stand-alone administrative PC. Hence, administrative computing is unlikely to merit a full-time dedicated post for some time. The pragmatic model is for these administrative ICT roles to be added to the duties of existing academic staff, and further support staff will be acquired as required. However, despite this lack of facilities, there is a strong interest and belief in the potential of ICTs to improve access to and the quality of learning in their remote region. Their strategy for the longer term is via "organic growth" into nearby small towns and rural areas via a combination of small physical "cyber-centres" and online access in collaboration with the Ugandan SchoolNet.

#### **5.5.4. ICTs and Access in HEIs (Including Literacy Issues)**

Apparently, Ugandan Universities generally agree that ICT literacy is a basic requirement for both staff and students, having progressed from the previous view that it is a skill for specialists, e.g. computer scientists. For example, both Makerere and Bugema have active policies driving ICT Literacy for all staff and students. The realization is growing that ICT literacy for all staff is essential if the growing number of radical, ICT-intensive institutional policies are to be put into practice. The suggestion was discussed and well received that HEIs should provide incentives to encourage staff to become ICT literate, and to acquire their own PCs.

The participants emphasised that there is growing demand for universal ICT literacy in all segments of Ugandan society, and they were optimistic that it will be achieved within a few years. They believe that Ugandan HEIs should encourage universal ICT literacy, so that their students will be ICT competent before they arrive at University. In addition, by establishing ICT literacy in remote communities, the HEIs would become more "in touch" with these poorest areas. Some universities are already moving in this direction, e.g. Uganda Martyrs University, which is in a rural setting, is providing ICT training for casual labourers and teachers from nearby primary schools.

The rarity of quality ICT training personnel is a major constraint. It is often assumed that ICT technicians can play the training role, yet they are usually poor teachers, so this can be a counter-productive strategy. Conversely, giving qualified teachers (of any subject) ICT training can be highly beneficial, since they "know how to teach". Ugandan experience is that the best results are produced by training the youngest teachers, including trainee teachers. It was also emphasized that ICT training is of little value when not quickly and regularly reinforced. In this context, the Ugandan beginner's tool of choice appears to be e-mail.

An additional serious concern is for the poor quality of some of the ICT literacy training courses that are frequently used in Uganda, as well as "junk ICTs" being distributed, particularly to schools. Some monitoring and standardization is urgently needed, and the participants believed that the HEIs could play a central role in establishing effective and appropriate preventative safeguards.

At Makerere, ICT literacy of all staff and students is the accepted policy. However, only some staff have workstations on their desks. Makerere cannot afford the set up, upgrade and maintenance costs of PCs for all staff, so project funding is used as the major method for growing the numbers of administrative PCs. For students, several PC labs are already installed in several departments, and more are planned, where the opportunities offered by OSS are being investigated and piloted. The Institute of Computer Science is in the process of opening a new centre, and their PC labs are thought to be the best equipped in Uganda.

Makerere is beginning to address ICT literacy issues in the wider Ugandan society, but only on an individual project basis under the "Innovations at Makerere" mechanism.

At Namasagali, there is a small PC lab containing five older pentiums connected in a LAN. As yet there is no Internet access, although this connectivity was planned for the end of 2003. A strategic ICT literacy programme for staff will not be in place for at least another two years. However, for the students, ICT literacy is a compulsory component in every course curriculum. There is no organizational strategy to address ICT literacy issues in the wider community, although some individuals have been given ad hoc access after hours.

#### **5.5.5. ICTs and New, Indigenous Learning Materials**

The participants accept that Uganda would need to continue to import learning materials from the developed world for some time, and that some of those materials satisfy immediate Ugandan needs. However, they believe that there are many local educational needs (at all levels) that are not adequately addressed, for example:



- Material that is sensitive to Ugandan cultural and linguistic issues;
- Materials for students with special needs, as well as disabilities;
- A wide range of material beyond the tertiary sector (e.g. primary, secondary, FET, ABET);
- A case of special relevance to this study involves ugandan Computer Science courses. The lack of access to PCs results in courses that are "95% theoretical". Yet, to produce ICT professionals who are immediately useful in the Ugandan economy, much more hands-on experience is needed.

Makarere is establishing a strategic e-learning initiative, e.g. a draft policy for "training the trainers" is going through its final phase of acceptance. Several current examples of "e-learning" software (both proprietary and Open Source) are being experimented with in several departmental projects. It is unlikely that Makarere will soon choose to standardize its e-learning activities on one such package, since none are perceived to comprehensively address recurring concerns about serious restrictions of pedagogical developments required to address Ugandan learning needs.

Importantly, in this remote area Namasagali staff have identified a significant need (and opportunity) to develop locally relevant multimedia-based material. They advocate CD-ROMs for their circumstances because they provide broad bandwidth and interactivity asynchronously, and hope to grow this capability in collaboration with appropriate partners (local, national and international). The many local learning needs spread across a range of levels, including:

- Home-based and subsistence farming of tomatoes. Local Ugandan learning material already exists, but needs to be converted into a multimedia environment.
- The conversion of existing English learning materials into Uganda and other local languages, as well as their *de novo* production.

There were several ideas about stimulating the local production of ICT-enhanced indigenous learning materials, including:

- HEIs could encourage final year undergraduate students to work on such indigenous material for their projects.
- Awareness needs to be created at the highest levels of government, as well as throughout the education sector regarding the importance of this local production capability both for socio-economic development and poverty alleviation.
- Training courses for the creation of new, technology-enhanced learning material are needed.
- A variety of incentives to individuals and institutions are needed to encourage the development of these new learning materials. These incentives need to be specified in national and institutional policies.
- A national facility will be needed to drive the production of this material, perhaps, initially as a special department in the National Curriculum Development Centre?

#### 5.5.6. Collaboration

The perception is that Ugandan universities do not have a history or culture of collaborating strategically. Hence, neither the Ugandan government nor society expect spontaneous "thought leadership" documents or processes from the tertiary sector on any major national issue, including the role of ICTs. The HEIs appear to be highly compartmentalized, rather than being open. A new initiative, with significant support from government and the International Community, will be necessary to encourage strategic collaboration between HEIs to produce coherent strategic material both at the national and institutional levels.

However, Uganda is actively involved in the AVU, with a facility at Makerere University. Several HEIs are independently setting up distance learning programmes with a variety of universities and tertiary organizations in the developed world.

The Uganda Communications Commission has set up a rural communications Internet project involving HEIs. Namasagali is importing some learning materials with support from the British Council, and is collaborating with the local Council in building capacity by providing ICT training services.

#### 5.5.7. Technology Innovations

The participants stated that OSS initiatives have become fairly common in Uganda over the past three years. For example, both Uganda Martyrs University and Makerere University have successfully established several Linux-based PC laboratories, whilst private companies, like Linux Solutions, are providing services based on OSS.



However, these activities are not coordinated, and the participants wondered whether Ugandan HEIs should not be encouraged to collaborate on investigating the need for a national OSS coordinating body. If the case was made, they could then investigate how such a body should be set up and structured, and what the most beneficial ongoing relationship with the tertiary sector could be. Similarly, the participants suggested that a Ugandan group should be established and supported to monitor the growing potential of wireless technologies.

Namasagali is investigating the possibility of becoming a center of local expertise in OSS (they are aware of some of the benefits of OSS, but the lack of connectivity leaves them isolated from this global community).

## **6. E-Campus and African HEIs: Findings from Web Study of Five Other African Nations**

The material for this section results from an Internet-based investigation of the major universities in five African countries. It is difficult to try and construct realistic portraits from the mosaic of information gathered in this way. University web sites present a veneer, or kaleidoscope lens, on the institution from which one can only assemble hints on what may be happening within. The amount and quality of information available on each institution is also far from uniform. It is, thus, sometimes necessary to draw conclusions from the absence of information. Clearly, there is a great risk of inaccuracies and misrepresentation. As a disclaimer we must state that the profiles presented are, thus, not necessarily a representation of what is actually the case, but more of what appears to be the case. There are, nevertheless, interesting patterns which emerge from this type of study.

The countries looked at in this way are Mozambique, Mauritius, Madagascar, Tanzania, and Zimbabwe. Of the five countries, only Mauritius and Mozambique have adopted national ICT policies to provide broad strategic direction. Tanzania is in the process of developing a national policy. Zimbabwe has no national ICT policy, but has recently launched a national Science and Technology policy.

### **6.1. Tanzania**

#### **6.1.1. National ICT Policy and Strategy**

Tanzania has been in the process of developing a national ICT policy since 1997. A first draft was presented by the Ministry of Communications to cabinet for approval in May 2002<sup>72</sup>. The development of this policy was coordinated through a national task force within the Ministry<sup>73</sup>, assisted by an organization of public and private individuals and institutions and donor organizations known as the eThinkTank<sup>74</sup>.

The Vice Chancellor of the University of Dar-es-Salaam (UDSM) is an active member of the task force. There is no explicit mention of UDSM involvement in eThinkTank. This may indicate that the eThinkTank organization has been largely private sector and donor-driven, or simply that the information is not readily available.

ICT capacity-building (through education and training) forms an important aspect of the objectives of the ICT policy. Significantly, the primary, secondary and tertiary education sectors are not viewed in isolation. A stated objective of the policy is to:

*“...develop and deploy a nationwide e-Education system that supports schools, 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 educational and vocational training in Tanzania...”*

Given that the greatest obstacle to e-readiness is identified as the low capacity of human capital in the use and maintenance of ICT, this emphasis is well placed.

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<sup>72</sup> Draft Tanzania National ICT Policy document: <http://www.tanzania.go.tz/ict/zerothorder.pdf>

<sup>73</sup> National ICT taskforce: <http://www.moct.go.tz/ict/>

<sup>74</sup> Tanzania eThinkTank: <http://www.ethinktanktz.org>

Access to ICT in Tanzania is primarily concentrated in Dar-es-Salaam, which has a growing number of flourishing Internet Cafés and two independent Internet service providers (ISPs). The UDSM also acts as an ISP with a subsidized price structure, though the range of clients it can service is limited by law.

### 6.1.2. University of Dar-es-Salaam (UDSM)

Much of the following information is taken from "Higher Education in Tanzania, a Case Study (October 2001)" published by Partnership for Higher Education in Africa, with more current input from the university's web site<sup>75</sup>. A significant amount of recent information is also available on the SIDA-SAREC project web site<sup>76</sup>.

The UDSM was first established in Dar-es-Salaam in 1961 as a college of the University of London. In 1963, it became a constituent college of the University of East Africa and in 1970, an independent national university, along with the other constituent colleges of Nairobi and Makerere. The university consists of six faculties, five institutes and two colleges.

#### 6.1.2.1. ICT Policy/Strategy

In the 1990's the university embarked upon a sustained programme of institutional transformation (referred to as the ITP). As part of the ITP and with assistance from Delft (Netherlands) University of Technology, UDSM approved an ICT Policy Plan and an ICT Master Plan in 1995. The University Computing Centre was given the role of overseeing ICT implementation and of serving as an IT resource-management centre for the entire university. The implementation project is referred to on the main university web site as INFOPOL. It is significant that the university's ICT policy and projects are given such prominence on the front page of the university web site.

*"The long-term objective of INFOPOL is the improvement of the institutional capacity of the UDSM in the areas of academic and administrative management as well as research and development through the improvement of its data processing capacities and its information resource management as defined in UDSM's IP plan and IT master plan."*

The INFOPOL project encompasses a broad plan for designing and implementing systems such as Financial Information System, Library Information system, Registration system, etc, as well as human resource and infrastructure development. Since the project started in 1995, many of its aims have been achieved, whilst others have been incorporated into later projects. INFOPOL has received substantial international donor support since its inception.

Most recent developments are happening under the umbrella of the SIDA-SAREC ICT cooperation initiative which appears to have revitalized the ICT strategy, picking up on what INFOPOL has started. The following excerpt from the project background illustrates the new thinking:

*"As part of the ongoing transformation programme, the UDSM has initiated a number of reforms aimed at improving its main outputs (teaching, research and services to the society) through ICT. The improvement of ICT aims to suit the needs of the students and staff, the working environment and establish linkages with both industry and government. The new ICT developments are also expected to contribute to income generation in order to complement government and other funding sources to ensure sustainable academic programmes.*

*With respect to offering quality service to various target markets and areas the University of Dar Es Salaam finds it necessary to invest more in the area of information communication technology in order to run the university's units more efficiently and effectively. This may be possible by increasing communication networks, more access to information and provision of quality teaching and research into its various faculties, institutes, bureau and colleges."*

There has been considerable progress made on infrastructural improvement, content and human resource development. The university has approved the transformation of the University Computing Centre (UCC) into

<sup>75</sup> <http://www.udsm.ac.tz>

<sup>76</sup> <http://www.sida-sarec.udsm.ac.tz>

a limited liability company, with the university owning all the shares in the first instance. It is intended as a means of generating off-campus income to help sustain ICT services at UDSM. The UCC, thus, operates as an ISP, as well as providing consulting services to the private sector. Other academic institutions in Dar-es-Salaam, such as Open University of Tanzania (OUT), pay US\$200 a month for a wireless connection to UDSM.

#### **6.1.2.2. ICT Infrastructure**

The campus computer network backbone, consisting of eight kilometers of high-speed fibre-optic cable, connects all 26 academic buildings, the Computing Centre and the library. As a start, each building has at least one point connected to the backbone. The three main campuses are linked to the backbone through a 2-11 Mbps wireless connection. The initiative includes installing fibre-optic backbone networks in the two other campuses, as well as LANs in all buildings. In addition, the Computing Centre will soon begin experimenting with a wireless link from Zanzibar to the mainland to connect Institute of Maritime Studies to the campus backbone.

**UDSM Library:** In 1994, the library was part of a three-year CD-ROM Pilot Project of the American Association for the Advancement of Science, through which seven African universities were provided with seven bibliographic CD-ROM databases and document delivery. The library has been able to maintain its CD-ROM services since the conclusion of the CD-ROM pilot project at the end of 1996, and now also subscribes to 18 databases. The library installed the automation software, ADLIB, in November 1998, to implement its Library Information System. The vendor trained two library staff members in the Netherlands. In addition, further training was organized at UDSM for more staff.

For the most part, the library uses the British Library Document Supply Centre for document delivery, requests which are free for UDSM students and staff, whilst non-university library users pay for the cost of the document ordered.

**Automation of UDSM Management Information:** Interestingly, there is no emphasis on developing MIS systems in the SIDA-SAREC initiative which focuses on hardware infrastructure, content, and people development.

With funding from Dutch and German sources, the university has two automation projects underway: Financial Information Systems (FIS) Project and Academic Registrar Information System (ARIS) Project. In October 2001, FIS was in its final stages of implementation with the physical infrastructure and hardware installed as well as the accounting and payroll systems databases.

In addition to these university-wide efforts, the Faculty of Engineering is creating its own administrative systems for staff data and student records, using faculty members to set it up. This faculty has been at the forefront of many of UDSM's ICT initiatives.

UCC (The University Computing Centre) has also been central to all of the ICT initiatives referred to above. They run the university web server using the open source Linux, Apache and PHP combination. Presumably, the ISP services they offer are running off the same platform.

#### **6.1.2.3. ICT Access and Literacy**

A large percentage of the teaching staff has easy access to computers through project funds. Postgraduate students, particularly those in the faculties of Engineering and Sciences, also have reasonable access, although this is not the case in every department. Undergraduates have the most difficulty in getting computer time, and many use the library for Internet and e-mail access. The university estimates that it should have one computer for every ten undergraduate students, with more PCs for those studying for postgraduate degrees.

The university has had access to the Internet through a Very Small Aperture Terminal (VSAT) link to South Africa since the mid 1990's. The link was first installed at a speed of 64 Kbps, then upgraded to 128 Kbps in 1998 (with a direct link to the United States) and to 512 Kbps in 2000, with SIDA-SAREC support. Further upgrading to 1 Mbps is planned.

#### **6.1.2.4. New Learning Materials**

The university has been actively investigating the use of ICT in teaching and learning. The first major project was the TEIL (Technology Enhanced Independent Learning Environment) project.

**TEIL project:** The TEIL project is an experiment in online learning, where various courses would be web-enabled using the commercial Blackboard educational management system. The project receives funding from the Belgian VLIR (Vlaamse Interuniversitaire Raad) and is developed in collaboration with the Catholic University of Leuven. The plan was to develop material and offer "online learning" initially in the Law Faculty and to expand from there. The web site lists several TEIL activities: researchers attended a conference on Blackboard in Washington DC in November 2000; in 2001 there were efforts to integrate TEIL into the Law Faculty; and in December 2001 a workshop on using Blackboard was organized internally by the TEIL team for the Faculty of Commerce. However, since then the project appears to have faded away.

**Instructional Technology Resource Unit:** An interesting development is the new Instructional Technology Resource Unit (ITRV) for e-learning capacity Development. There is not much information about it on the web site, but again it is the Faculty of Law that is involved. Even if the earlier Blackboard project failed to reach its objectives, the experience gained is being used in the new initiative, so the overall outcome may still be positive. This unit may well be an output of the SIDA-SAREC sub-project on content development, which was scheduled to start in 2000. Significantly, the SIDA-SAREC project recognizes the need and potential for content development to benefit an audience beyond UDSM:

*"It will enable the UDSM to make training materials available to other institutions for education and research through publishing on the Web, through distribution of CD-ROMs and through e-mail communication".*

#### **6.1.2.5. Collaboration**

The University provides Internet access to other educational institutions in Dar-es-Salaam. Clearly there has been collaboration with international donors in all of the projects mentioned above. UDSM is an active member of the Inter-University Council for East Africa, and also acts as a site for the Africa Virtual University, but the lack of infrastructure has hampered progress in this area.

#### **6.1.2.6. Technology Innovations**

UCC (The University Computing Centre) runs the university web server using the open source Linux, Apache and PHP combination. Presumably, the ISP services they offer are running off the same platform. It is tempting to conclude that the use of open source software has enabled innovation and entrepreneurship in this case.

As discussed above, wireless technologies have been used to link the three main university campuses with further plans to extend a wireless link to the Institute of Maritime Studies on the island of Zanzibar.

## **6.2. Mozambique**

### **6.2.1. National ICT Policy and Strategy**

The driving body for developing and implementing an ICT policy is the *Comissão para a Política de Informática* (Commission for the Politics of Informatics). This commission was set up in May 1998 to advise the cabinet on an ICT policy for Mozambique. The draft policy<sup>77</sup> was approved by the Council of Ministers in May 2000. The following excerpt from the introduction of the policy summarizes the sense of exclusion felt in Mozambique:

*"Unfortunately, that which has come to characterize modern life in nearly the whole world is little felt in Mozambique and the majority of African countries, which continue to have the lowest teledensities in the world and the fewest computers and Internet users, thus depriving citizens of what in most parts of the world is accessible by a mouse click or the touch of a keyboard."*

<sup>77</sup> Mozambique ICT policy: [http://www.infopol.gov.mz/pdf/strg\\_eng.pdf](http://www.infopol.gov.mz/pdf/strg_eng.pdf)

The case for ICTs in a country facing huge developmental challenges must be argued within the confines of national priorities. Faced with the problems of limited resources, inadequate networks for telecommunications and electrical power and a high incidence of illiteracy, the ICT policy focuses on the potential of ICTs to meet broader developmental goals. The following lists the main objectives of the policy:

- increase national consciousness about the role and potential of ICTs for the sustainable development of Mozambique;
- expand and develop training about information science, in the National System of Education;
- encourage and support the training of government authorities, community leaders, women, youths, and children about computer usage;
- contribute to the elimination of absolute poverty and the improvement of the standards of living for Mozambicans;
- contribute to increasing efficiency in the public and private sectors;
- provide universal access to information for all citizens in order to improve their level and productivity in education, science and technology, health, culture, entertainment, and in their other activities;
- create a favourable climate for industry, business and investment in ICTs;
- facilitate Mozambique's integration and participation in the local and global economy and in the global information society;
- ensure that all development plans and projects in every sector have ICT components;
- help to reduce and, eventually, eliminate all regional asymmetries and the differences between urban and rural areas, and between the various segments of society, as regards access to development opportunities;
- create a proper environment for cooperation and partnerships in ICTs, between the public and private sectors, and between all interested parties at the national, regional and international levels; and
- help Mozambique become a producer, not a mere consumer, of ICTs.

Education is seen as one of the most important components of the successful implementation of the policy. There is a self-reinforcing argument which, on the one hand, requires the use of ICTs to improve quality and access to basic education, and on the other, requires the training of ICT professionals to create the infrastructure and content to facilitate the former. Thus, as in the case of the Tanzanian policy referred to in the previous section, there is recognition of the role of tertiary education in addressing the needs of the education sector as a whole.

### **6.2.2. University of Eduardo Mondlane**

Eduardo Mondlane University<sup>78</sup> is the only public University in Mozambique. It was founded in 1962, soon after the start of the African wars of independence, by the Portuguese government. When the university reopened after the war of independence in January 1975, the staff and student body had been severely depleted due to the exodus of Portuguese colonists fearful of an African government with socialist tendencies. Student numbers fell from 2,433 in 1975 to 750 in 1978, while the Mozambican teaching staff was reduced to a mere 10. The current statistics indicate an enrolment of 8,046 students, with the largest numbers in the Sciences and Engineering, including 313 students enrolled in Computer Science.

The university web sites (there are a number of faculties with their own sites and servers) are almost entirely in the Portuguese language. This presented some difficulties for the researchers, but much use was made of the "google" translation tools<sup>79</sup>. Machine translation is far from perfect. The resulting rendered English text is clumsy though sometimes refreshingly honest – one project for a research computer lab was translated as "still being in the quarrel stage"!

#### **6.2.2.1. ICT Policy/Strategy**

The university has a strategic plan which refers to the use of ICTs in a number of contexts, but there is no evidence on the web site of an ICT policy or strategy as such. Section 4 of the Strategy Plan addresses ICT

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<sup>78</sup> <http://www.uem.mz>

<sup>79</sup> <http://www.google.com>



systems. The four points raised under this header deal primarily with the efficiency of management information systems:

- Improve the system for sending, receiving and circulating internal and external correspondence, both national and international. For example, each sector could be encouraged to have its own post box.
- Equip each sector with efficient and operational telecommunications systems. These systems could be telephone (including fax), computer, or radio where applicable.
- Establish a computer network to connect all sectors, with priority for the registry and financial and human resource management. This action will need to be complemented by the computer network for connecting the libraries laid down in Strategic Objective 2.
- Install a system for gathering and disseminating information about internal and external decisions that have an impact on the university.

The use of ICTs is mentioned in the sections of the plan dealing with improved teaching methods and upgraded library facilities, but it falls short of making basic recommendations such as increasing students' access to PCs and the Internet.

#### **6.2.2.2. ICT Infrastructure**

**Centre Informatica (CIUEM)** is an institution whose mission is to provide ICT support to the university. It provides Internet access, web design and hosting, system design, computer maintenance and training to the university and the public. It acts as a focus for ICT within the university, but also plays a very prominent national role. In 1996 CIUEM started a project of installing an integrated network of data, voice and power for the UEM, allowing communication between all the departments of the University. The first phase of EMUNET was installed through 1998 with the intention to extend access to the Internet to the entire university community. Interestingly, the distributed nature of the university within the city of Maputo required the early adoption of innovative wireless links between the various campuses as well as some other institutions (such as the Ministry of Education), set up in collaboration with the CSIR in South Africa.

EMUNET has continued to expand since its inception, with significant input from SIDA-SAREC in 2000. A fibre-optic ring was installed at the main campus. A further five sites outside the main campus were fitted with LANs and linked to the main campus via a wireless backbone.

In 2002, another SIDA sponsored project, MozambiqueOpen, made some inroads into extending access to student and staff residences. The project was designed and implemented by students from the Swedish Royal Institute of Technology and UEM, with the aim of duplicating in Maputo, the Open.Net network technology which is being successfully deployed in Swedish universities. The aim of Open.Net is to allow subscribers to freely move between different service providers (other than CIUEM in this case). The concept proved to be not entirely portable: unlike Swedish students, Mozambican students saw no advantage in connecting to alternative ISPs, particularly when they have free access during the day anyway. Also the main attraction of wireless access points within student residences is that the student can roam with a *laptop* within the residence and remain connected. Students with laptops are far rarer in Maputo than perhaps they are in Stockholm. Nevertheless the project was deemed a success, both in terms of the learning experience for the students involved, and the installed working infrastructure.

There have been plans to computerize and centralize the library administration (like the rest of UEM, the library is spread across the city), but there is no up-to-date information available on progress.

#### **6.2.2.3. ICT Access and Literacy**

Not much information is available about the number of computers or the level of access for students. Computer science students do have access to computer labs at CIUEM from which they can access the Internet. CIUEM offers a range of courses from basic computer literacy to multimedia and web page design. There is, however, no indication of whether there is an institutional ICT literacy policy, or whether computer literacy is an integral part of courses offered by faculties within the university.

#### **6.2.2.4. New Learning Materials**

There appears to be a tradition of interest and activity in the area of developing new learning materials at UEM. CIUEM was developing a suite of software for teaching basic mathematics as far back as 1995.



The CHES<sup>80</sup> project provides a support service for students, educators and researchers at UEM aimed at the introduction of the new technologies in the field of education collaboration.

World Bank sponsored collaboration between UEM and Technical University of Delft in the period between 1998 and 2002. The project was aimed to strengthen UEMs capacity to use ICTs effectively in management and teaching. The subject of the project was the training of academic and administrative staff in management, information systems and ICT-related subjects. As part of the training programme, research was carried out on how upcoming technology, enhanced training, and distant learning techniques can be applied in the Mozambican context. The resulting improved technical facilities, expertise and knowledge capacity were explicitly intended to enable the UEM to support other educational groups outside the university.

ICT-driven distance education has become an integral part of Mozambique's national strategy and UEM has played a central role in designing and implementing infrastructure and systems, as well as appropriate learning material. UEM has also collaborated with the Ministry of Education, the IDRC and the World Bank in the setting up of the Mozambican SchoolNet.

### **6.2.2.5. Technology Innovations**

The foregoing discussion has shown that the UEM has been active in just about every new ICT-based technology initiative in Mozambique. CIUEM, in particular, has been consistently innovative.

The use of wireless networking in the university backbone is widespread. As part of its distance education focus, UEM has set up video-conferencing facilities and implemented links to multi purpose community centres (MPCCs) in Manhica and Namaacha provinces.

Open source software powers the web infrastructure of the university, with all servers running the Apache software, mostly on top of either FreeBSD or Linux. It is not clear what further level of open source penetration there has been.

## **6.3. Madagascar**

### **6.3.1. National ICT Policy and Strategy**

There is no apparent national policy on ICT development in Madagascar. The fact that Madagascar has a very minimal web presence is, perhaps, indicative of the lack of development in this area. One of the few links that could be found is to an ongoing World Bank sponsored private sector development project, which includes the objective of:

*“providing direct assistance to private Information Communication Technology (ICT) companies through the Fonds d'Appui au Secteur Prive (FASP), an entirely locally run private sector Institution, to develop new ICT services as new source of growth.”*

It is not clear where the ICT skills to take such projects forward will be coming from. The focus of government spending on education is shifting away from the tertiary sector, toward the extremely under-resourced primary and secondary school sectors. Access to basic education and literacy are the national priority. There is no evidence of the planned use of ICTs to address these needs.

The redirection of spending away from the tertiary sector is partly in response to damning World Bank reports on the crisis in the sector. For example, the following is excerpted from **Madagascar: A Decade of Reform and Innovation in Higher Education, 2000:**

*“Higher education in Madagascar was in crisis in the early 1990s. Campuses were taken over by squatters and vandals. Little, if any, teaching was taking place because senior members of universities could not enter buildings. The quality of education was extremely low, with little or no research conducted, the staff demoralized, and the students alienated. Enrolment rose above 44,000 due to “eternal students” who were paid a grant for as long as they stayed in university. Students repeated course years as many as five times. The internal efficiency of institutions was approximately 30 percent, and external efficiency was less than 10 percent in many faculties and departments. Curricula and teaching methods were outdated and there*

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<sup>80</sup> CHES: Service of Computers for Superior Education – Google translation.

*was no system for evaluating the institutions' performance. A large portion of the public financing was being wasted.*<sup>81</sup>

The reforms, which have taken place since, have apparently improved the situation, but it is clear that the universities are not being seen as powerhouses of ICT development in Madagascar.

### **6.3.2. University of Antananarivo**

#### **6.3.2.1. ICT Policy/Strategy**

With nearly 12,000 students, the University of Antananarivo<sup>82</sup> is the largest of the island's six public universities. There is no indication of an ICT strategy on the university's web site. The site is also entirely in French (necessitating the use of Google's translation service again).

#### **6.3.2.2. ICT Infrastructure**

It is difficult to get an idea of the university ICT infrastructure from the information presented. Besides a photograph on the front page of a student at a computer and an invitation to log in for web mail access, there is no obvious further information.

The web site itself is run by a centre within the Department of Mathematics and Informatics known as MISA (Maitrise en Informatique et Statistique Appliquees)<sup>83</sup>. It appears to be a semi-autonomous project within the university set up through French Cooperation. Besides running the university web site, the centre offers diploma courses which aim to be closely shaped by the needs of the local ICT industry.

#### **6.3.2.3. ICT Access and Literacy**

There is no information we could find to indicate levels of access or ICT literacy.

#### **6.3.2.4. New Learning Materials**

There is no information available about ICT-enhanced learning materials.

#### **6.3.2.5. Collaboration**

There is not much evidence of collaboration in the ICT area. Presumably the MISA centre referred to above maintains links with the local ICT industry.

The university is part of Agence Universitaire de la Francophonie (AUF), which provides document retrieval services and Internet access to registered users. Registered users are restricted to academic staff, researchers, and students in their second year or higher.

#### **6.3.2.6. Technology Innovations**

There is no indication of new technologies being used. However, the MISA site is running the Apache web server on Linux.

<sup>81</sup> <http://www.worldbank.org/afr/findings/english/find159.htm>

<sup>82</sup> <http://www.univ-antananarivo.mg>

<sup>83</sup> MISA: <http://www.misa.mg>

## 6.4. Mauritius

### 6.4.1. National ICT Policy and Strategy

The case of Mauritius is very different to the other countries surveyed in this section. It is a geographically small island which boasts a staggering 21% private household penetration of PCs. Its economy has been growing steadily, much of it on the back of a thriving ICT sector. An indicator of the growth of the sector is that the import of IT hardware has grown at an average rate of 25% per annum over the past five years. Mauritius also enjoys the advantage of a convenient position on the SAFE (South Africa Far East) link. The SAFE optical fibre project refers to the submarine installation of a 28,000 kilometers long telecommunications cable, linking Europe to the Far East via Mauritius. It has been operational since June 2002. The capacity of the system is 130 Gigabits, enabling Mauritius to respond efficiently to an increasing demand in telecommunications traffic, multimedia services and the Internet.

Mauritius has a fairly advanced broad-based information policy compared to other African countries. Modeled on the Singapore ICT policy, the Mauritius strategy involved creating instruments for the implementation of ICT policy (Ministry of Information Technology and Telecommunications, National Computer Board), liberalizing the telecommunication sector, creating an IT-literate workforce, improving the capacity of public institutions to harness ICTs and positioning Mauritius to be a key player in ICTs by creating an enabling environment and robust infrastructure.

Part of this effort has been in addressing the regulatory and legal framework for ICTs. Three laws passed since 1997 which have directly influenced the ICT drive, are:

- **The Copyright Act, 1997:** Provides the appropriate legal framework for the protection of intellectual property rights, including software and electronic databases. This law has paved the way for major information technology companies such as Microsoft to set up a regional office in Mauritius.
- **The Electronic Transaction Act, 2000:** Provides the appropriate legal framework to serve as the foundation to facilitate electronic transactions and communications.
- **The Policy Framework for ISPs, (Feb. 2001):** This document sets out the policy framework for the provision of Internet services in Mauritius, in line with the Government's plan to liberalize the ICT sector and accelerate the transformation of Mauritius into a knowledge-based economy.

**The National Computer Board (NCB)**<sup>84</sup> was established by government in late '96 as a parastatal institution whose aim is to assist in the diffusion of ICTs in the various socio-economic sectors of the country. The NCB is the programme manager for the **National IT Strategy Plan (NITSP)** as part of the Mauritius government's strategic objectives to move the country toward an information age economy. An adequate supply of well-educated and skilled ICT professionals is essential for the materialization of the government's objective to turn Mauritius into a "Cyber Island".

As part of phase II of the NITSP, seven key strategic actions have been identified. The one with the greatest impact on the tertiary education sector refers to Human Resource development to support the envisaged needs:

*"Human Resource – To enhance the physical and faculty capacities of the existing IT tertiary institutions and to set up new institutions to achieve a five-fold increase of the IT professional pool within seven years and to set critical IT skill development centres."<sup>85</sup>*

To bolster its aim of increasing the number of trained ICT professionals the Government of Mauritius approved the setting up of the University of Technology, Mauritius in January 2000. The new university offers diploma and degree courses in IT-related disciplines. Nevertheless, University of Mauritius is still the largest producer of ICT professionals and the only institution producing PhD graduates.

### 6.4.2. University of Mauritius

University of Mauritius<sup>86</sup> is located at Réduit, which is about 15 minutes drive from the capital city, Port Louis. It was established in 1965. 1999 Strategic Plan puts enrolment at 3,700 students, with a projected enrolment of 6,000 in 2003/4.

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<sup>84</sup> National Computer Board: <http://www.ncb>

<sup>85</sup> <http://www.uneca.org/aisi/nici/Mauritius/mauritius.htm>

<sup>86</sup> University of Mauritius: <http://www.uem.mz>

#### **6.4.2.1. ICT Policy/Strategy**

The university does not have a distinct ICT policy, but ICT forms a significant part of its 1999–2004 Strategic Plan. The use of ICT in the Strategic Plan is mentioned both in the context of improving the efficiency and effectiveness of management, and in improving the quality of teaching and learning.

#### **6.4.2.2. ICT Infrastructure**

The university ICT infrastructure is maintained by the Centre for Information Technology and Systems (CITS) which is a service department responsible for everything from the network infrastructure to designing and maintaining the management information system software.

The physical ICT infrastructure (numbers of workstations, servers, network configuration, etc) is described in detail on a web site which is out of date. Mention is made of upgrades planned for 1999, so it is difficult to extrapolate to the situation in 2003. Nevertheless, the situation in 1998/9 appeared quite healthy. All faculties were connected to the university backbone, fibre-optic core was installed in all buildings and connection to the Internet was via a dedicated 64 Kbps link.

The ratio of students to Internet-connected workstations was 100:1, but projections were that this figure would be reduced to 25:1 by the year 2000.

CITS are particularly proud of their achievements in designing the management information systems of the university, although the description of the systems on the web site is out of date. This is unfortunate because it reflects badly on a centre which appears to have done some very worthwhile work. This is particularly so as the centre enjoys a prominent link off the University's main page.

#### **6.4.2.3. ICT Access and Literacy**

ICT literacy is presumably high as it is now a compulsory component of the Mauritius secondary school curriculum, with all secondary schools having computer labs.

The latest information available is from 1998, when there were at least three computer labs providing students with access, albeit with a low ratio of PCs to students. It is likely that this situation has been much improved in the interim.

#### **6.4.2.4. New Learning Materials**

University of Mauritius shows a high level of innovative activity in this area.

Virtual Centre for Innovative Learning Technologies (VCILT)<sup>87</sup> is responsible for providing and developing online web-based education and tele-learning at the university and throughout the country. VCILT currently develops academic modules for the university and pedagogical prototype projects in line with the national ongoing effort for the promotion of ICT, continuous education and lifelong flexible learning.

VCILT has developed a Learning Objects Repository containing online (and mixed mode) courses for registered students and staff members. A number of multimedia courses are currently available. What is most interesting is the engagement that the VCILT is having with the global community. Members from VCILT have been active at conferences relating to Open CourseWare. VCILT (in collaboration with the University of Reunion) is hosting the ICOOL (International Conference on Open and Online Learning) in December 2003.

This increasing interaction is exposing the contradiction between open learning, on the one hand, and a closed intellectual property right regime, on the other. There are links to the MIT open courseware and the OKI (Open Knowledge Initiative). The current status of the copyright of the Learning Objects Repository is clearly in flux: the answer to the question about copyright on the LOR FAQ is "... thinking about" it.

<sup>87</sup>Virtual Centre for Innovative Learning: <http://vcampus.uom.edu.mu>

#### **6.4.2.5. Collaboration**

The VCILT project is actively collaborating with the international community of Open Learning.

There is little explicit information available on how the university's activities in the ICT realm fit with the broader government-driven national ICT policy. Certainly, we see VCILT generating new learning material to be used throughout the country in support of the national ICT promotion aim. The approach of producing multidisciplinary ICT-literate graduates (according to its strategic plan) is in stark contrast, for example, to the mission of the new University of Technology to produce focused "IT professionals".

#### **6.4.2.6. Technology Innovations**

As discussed above, much of the technology description available is out of date. We can see empirically from the web site that, of all institutions surveyed in this section, University of Mauritius is the only one running a proprietary web server platform. There is evidence from the (outdated) infrastructure report that a number of the servers within the university were running the Linux operating system. It is interesting to note that the VCILT web site is running the Apache web server, although on top of the Microsoft Windows NT operating system.

There is no description available of new network technologies being used (such as wireless), but there does appear to be considerable interest in tele-conferencing technology.

### **6.5. Zimbabwe**

#### **6.5.1. National ICT Policy and Strategy**

In recent years Zimbabwe has been wracked by economic and political turmoil, exacerbated in particular by the land settlement crisis. A significant depreciation of the Zimbabwean dollar, fuel shortages, high inflation, political instability, and the threat of HIV/AIDS are having detrimental effects on Zimbabwe's overall national development as well as the nation's Networked Readiness<sup>88</sup>, in which it ranks seventieth. Concerns from prominent players in the ICT industry highlight the country's inability to find foreign currency to pay for bandwidth and equipment as well as the growing loss of skilled ICT professionals. In the midst of these troubles, and following lengthy legal disputes, a handful of successful ICT companies have emerged in Zimbabwe. These pockets of innovation, although enjoyed only by a small minority, can be found in the wireless and ISP markets.

There is no evidence (at least on the web) of a government focus on developing a national ICT policy. The contrast with Mauritius has not gone unnoticed in the local media. Roy Steiner, managing director of a Harare-based web solutions company, wrote in the 18 April 2002 edition of the Financial Gazette:

*"What makes this goal different in Mauritius compared to many other Southern Africa Development Community countries is that tremendous political will is being invested in the approach."*

The private sector, at least, clearly feels that given the relatively developed (if overregulated) telecommunication infrastructure.

#### **6.5.2. University of Zimbabwe**

The University was founded in 1945, 6 km north of Zimbabwe's capital, Harare. All 10 faculties are located at the Mt Pleasant site. The College of Medicine is situated at Parirenyatwa Hospital, Zimbabwe's largest referral hospital. A new Health Sciences college, the Bulawayo College of Health Sciences has been set up in Bulawayo with a Pro Vice Chancellor and a Dean. The college is situated at the National University of Science and Technology (NUST) and the clinical departments are situated at Mpilo Hospital and United Bulawayo Hospital.

The student population stood at 10,139 in 2001.

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<sup>88</sup> HARVARD University and the World Economic Forum released a comprehensive international study in 2002 of information technology use and issues around the world. The networked readiness index (NRI) ranks 75 countries according to their capacity to take advantage of ICT networks.

**6.5.2.1. ICT Policy/Strategy**

There is no evidence on the university web site of an ICT policy or strategy.

**6.5.2.2. ICT Infrastructure**

The university operates a campus-wide network connected to the Internet, called Zimbix, as well as two store-and-forward e-mail hosts: EsaNet and HealthNet. These facilities are quite mature and have been operating since the mid 1990s. The Internet connection is via a 64 Kbp leased line. The ICT infrastructure of the university is operated by the Computer Centre. The centre offers a number of services, including training courses for staff and students and the use of computer laboratories. The web site has not been actively maintained, so it is likely that much of this information is now out of date.

Given the budgetary constraints of the university and the problem with foreign exchange, it is likely that much of the equipment is also outdated. The exception here may be the library which has been supported by Anglo-American corporation and is able to provide electronic access to a large resource of electronic books and journals.

**6.5.2.3. ICT Access and Literacy**

The campus-wide network links all faculties, the library and administration buildings. Computer labs, besides those at the computer center, exist in some faculties (e.g. Engineering) but reliable statistics of their capacity and numbers are not available on the university website. Most academics have access to their own workstations connected to the campus network.

There is no information available on ICT literacy, but given the history of the university one can assume the levels are fairly high. The computer center offers short ICT-related courses to the general public, including courses on web development, Linux administration and network administration.

**6.5.2.4. New Learning Materials**

There is little available information on the use or development of new ICT based learning materials.

Teaching and Learning Support Centre offers computer literacy courses, but does not appear to be actively working on using ICT as a new learning paradigm.

African Languages Institute within the university is using electronic databases to support the creation of African language dictionaries.

**6.5.2.5. Collaboration**

The university has historically been connected to many of the ICT initiatives within the country due to its offering of e-mail infrastructure to NGO's, schools, and the health sector (via HealthNet). HealthNet was used for a number of innovative ICT assisted projects, such as the early warning system for dangerous diseases in the mid 1990s.

Two institutes within the university are participants in the *Supply of Academic Publications to and from Universities in Developing Countries* project, which aims to solve, in a sustainable way through the use of email and the World Wide Web, two of the key-problems that universities in developing countries are facing:

- Their lack of access to current scientific literature, as published in (international) academic journals.
- Their impossibility to publish and present their own academic publications beyond the local scale of their own university or region.

**6.5.2.6. Technology Innovations**

There is little evidence of any new ICT technologies being used by the university. However, it is interesting to note that despite its difficult situation, University of Zimbabwe has become a center of expertise in the use of Linux and open source software.



## 7. Summarised Findings from Study Tour and Desktop Survey

This section analyses the extensive findings set out in the previous two chapters, where the perceptions from ten African countries (Senegal, Ghana, Ethiopia, Kenya, Uganda, Tanzania, Mozambique, Mauritius, Madagascar and Zimbabwe), expressed either in person or via the web, are summarized. The intention is to summarize the prevailing *perceptions* regarding trends, concerns, and opportunities, as well as to identify interesting examples and strategic gaps.

### 7.1. Regional/National Policy and Strategy Issues Relevant to “E-Campus”

The development of Africa’s Information Society is multifactoral and complex, facing such problems as:

- the lack of policies at all levels;
- insufficient funds, from both governments and the international community;
- inadequate telecommunications infrastructure and related restrictive regulations;
- limited telephone and Internet access;
- limited electrical power access; and
- low levels of both ICT specialists and general ICT literacy.

Some governments have begun to address the development of their Information Societies, usually via an Information Society Policy. But a great deal more needs to be done, especially since concerns are frequently raised regarding the comprehensiveness and the transparency of the processes used in creating such national ICT-related policies, threatening their legitimacy.

A general concern emerged that “most people in African leadership positions are aware of the importance of ICTs, but are not well enough informed to know specifically what to do”. Governments are perceived to be struggling to implement initiatives which bring real benefits from ICTs to society, and particularly to be failing to create an enabling environment for the private sector to contribute to these national initiatives, by opening up the ISP environment; liberalizing the telecommunication sector; or creating ICT “incubation hubs”. Conversely, many of Africa’s private sector ICT providers are seen to lack a “professional ethic”, often distributing poor quality or inappropriate hardware and software, and even indulging in bribery and other corrupt practices. Standardization and coordination bodies are urgently called for to rectify this widespread problem. How should Africa’s HEIs contribute?

It is widely believed that for local African ICT industries to grow and perform much better, many more and better quality ICT specialists and professionals across a range of levels are required. The largest obstacle to Africa’s “e-readiness” is identified as the low capacity of human capital in the use and maintenance of ICT. The widespread chronic shortage of ICT experts is having the inevitable result that crucial individuals who have been driving national and regional ICT development initiatives have been lured into the private sector, often in the developed world. Africa’s HEIs appear to be individually ignoring rather than strategically addressing these issues.

There is little awareness of any specific, coordinated, national policies regarding the role(s) of ICTs in education in general and the tertiary sector in particular. ICTs for higher education initiatives are seen to be fragmented, donor-driven, inflexible, and usually departmentally compartmentalized both at the institution and government levels. The general wish is to replace these with integrated, coordinated, and sustainable strategic initiatives. The growing excitement regarding the perceived potential benefits of ICT based distance education, is tempered by the concerns of experts that there are several forms of distance education that are inappropriate for Africa’s need for quality based massification of education, and could prove ineffective, wasteful, and counter-productive.

Throughout Africa, the funding of all sectors of education represents a growing problem at national and institutional levels. Funding is seen to be possibly the greatest restriction to the development of "e-campus" in Africa. Three fundamental issues were repeatedly raised:

- Does the "commodotization" of education (e.g. the WTO's ruling that universities may compete freely worldwide) enhance or hinder UNESCO's drive for "Education for All"?
- Should education systems be based on the concept that "knowledge can be owned, and must be purchased", or that "knowledge is a global good that should be freely available and easily accessible"?
- What proportion of Africa's future expenditure on ICT-enhanced open education (both running costs and investment in development) should be borne by government; the various categories of learners; the private sector; international agencies; and others?

Despite these gaps, Africa's HEIs are not playing collaborative, strategic "thought leadership" roles yet in anticipating and guiding developments central to national and regional ICT policies, or to foster greater awareness of the benefits of ICTs among all sectors of African society. For example, "thought leadership" is needed regarding the multiple factors which are restricting a wide range of potential ICT initiatives to improve education, particularly for the most remote and poorest communities.

**Interesting Example, Tanzania:** The first draft of a national ICT policy was presented by the Ministry of Communications to cabinet for approval in May 2002. ICT capacity building (through education and training) forms an important aspect of the objectives of the ICT policy. Significantly, the primary, secondary and tertiary education sectors are not viewed in isolation. A stated objective of the policy is to:

*"...develop and deploy a nationwide e-Education system that supports schools, 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 educational and vocational training in Tanzania."*

**Interesting example, Mauritius:** The case of Mauritius is unusual in Africa. It has a fairly advanced broad-based information policy modeled on the Singapore ICT policy, and liberalizing the telecommunications sector; creating an IT-literate workforce; improving the capacity of public institutions to harness ICTs; and positioning Mauritius to be a key player in ICTs by creating an enabling environment and robust infrastructure. Its economy has been growing steadily, much of it on the back of a thriving ICT sector. In order to create an adequate supply of well-educated and skilled ICT professionals to meet the objective of turning Mauritius into a "Cyber Island", the government has committed:

*"...to achieve a **five-fold** increase of the IT professional pool within **seven years** and to set up critical IT skill development centres."*

## 7.2. ICTs and HEI Administration (Including Institutional Policy and Strategy Issues)

Historically, there has been limited guidance and support at either the national or institutional level to assist African HEIs to develop and implement appropriate ICT policies and strategies. Hence, most HEIs have addressed their immediate ICT needs in an ad hoc fashion, often at (or below) the departmental level.

In most large public African HEIs, their ICT infrastructure and its management have evolved differently from their developed world counterparts. Thirty years ago in Europe and the USA, most HEIs had mainframes supported by fairly large, centralized computer services departments. Although the progressive development of minicomputers, networks, desktop computers, LANs, the Internet, and mobile computers has dramatically changed the activities of the original computer centres, their "centralized control model" still dominates. In Africa, ICTs began to make an impact in almost all HEIs only comparatively recently, when the "desktop era" had already arrived. Instead of managing a large, expensive mainframe, the need has been to manage the pooling, coordination, and later networking of growing numbers of scattered PCs and servers, with a variety of owners, and often running incompatible software. The development of Internet services (often via VSAT), linked to the campus backbone has further stimulated end-user demand, and reinforced the establishment a more flexible, distributed, coordination environment, rather than a centralized control function.

In response, some African public HEIs have experimented with the provision of centralized ICT services via computing centres, whilst others have set up ICT steering committees made up of a range of institutional stakeholders, sometimes with representatives from the highest level, sometimes with limited powers. However, the end-users usually have a significant voice, and have been able to emphasize that ICTs are cross-cutting technologies, and therefore, that it is important to recognize and consult all the people who may be involved, both at the strategic and implementation levels. This appears to be a more appropriate model than “central control” in the African context, but the issue of understanding and support by the HEI’s executive team is crucial. It appears that only those HEIs which have established an ICT executive role at the highest level (i.e. working closely with the executive team), are starting to realize the full range of benefits that ICTs can provide.

Even today, most African HEIs (both public and private) do not have comprehensive institutional ICT policies and strategies – the documents are “in the process of being developed”. As IC-literacy is spreading through campuses, the previously centralized ICT strategy and policy development processes are tending to become distributed, more transparent and inclusive, and more responsive to emerging needs. However, the problem of the traditional culture of faculty autonomy clashing with the organizational need for high level ICT “control” (e.g. standards, compatibility, interoperability, security, cost savings), can paralyze progress unless well managed.

In several young, middle-sized African HEIs, ICTs are being managed better, with significant benefits already being experienced by both staff and students. The administrative head of ICT interacts directly with the institution’s top management (often due to the flatter, less formal structure of these less traditional organizations), and is supported by a dynamic ICT committee made up of a range of institutional stakeholders. ICTs are being used at higher levels of “efficiency and effectiveness”, enabling them to function with a leaner administration, yet the quality of their education and facilities ranks among the best on the continent. Interestingly, there is a concern that if these HEIs grow too large (i.e. beyond the 5,000 student level), many of these ICT-based benefits may be significantly reduced.

In most small, private HEIs, ICT infrastructure is almost non-existent with just a few PCs, and perhaps the odd server(s). In the absence of a formal computer services facility, the pragmatic model appears to be that administrative ICT roles (including the ICT leadership role) are added to the duties of existing ICT-literate staff. As demand grows, further support staff may be acquired, with outsourcing being a useful option. Similarly, ICT strategies tend to be developing informally as the ICT facilities evolve and grow. Formal ICT policy and strategy documents are seldom seen as a priority.

The general chronic shortage in Africa of people with the necessary range of ICT expertise affects HEIs in several ways. HEIs cannot match private sector ICT salaries, so their best ICT staff (both administrative and academic) are frequently poached; they usually have to employ inexperienced or underqualified ICT staff; and ICT posts often remain unfilled for lengthy periods. In addition, because most African HEIs are young, or have been using ICTs only fairly recently, people with expertise and wide experience of ICT applications relevant to HEIs are very rare. Finally, the severe shortage of quality ICT teaching staff results in only a small proportion of students who require an ICT qualification being able to register for a reasonable quality ICT course in Africa. This represents a severe negative feedback loop with major repercussions on potential economic growth and poverty alleviation, but which governments, the private sector, and HEIs are failing to comprehensively address.

**Interesting example, Centre Informatica, University of Eduardo Mondlane:** (CIUEM) provides Internet access, web design and hosting, systems design, computer maintenance and training, not only for the university but also to the general public. Beyond its activities within the university, CIUEM plays a very prominent role in all national (and many regional) ICT initiatives, in close collaboration with Mozambique’s President, Prime Minister and other government stakeholders, the private sector, and the international community.

**Interesting examples, USDM:**

- The campus backbone, consisting of eight kilometres of high-speed fibre-optic cable, connects all 26 academic buildings, the Computing Centre, and the library. The three main campuses are linked to the backbone through a 2-11 Mbp wireless connection. The backbone is linked to the Internet via VSAT to South Africa, and is soon to be upgraded to 1 Mbp.

- Approval has been given for the transformation of University Computing Centre (UCC) into a limited liability company. The UCC operates as an ISP with a subsidized price structure (though the range of clients it can service is limited by law), as well as providing consulting services to the private sector. It is intended as a means of generating off-campus income to help sustain ICT services.

**Further interesting examples:**

- ICT champions are selected in every faculty and department, and given the authority and responsibility to identify and channel their ICT needs into the ICT strategic and policy processes, and to actively participate in those processes.
- A high level, fully empowered Strategic ICT Committee has been set up, with flexible membership to reflect the ongoing development of the organization's evolving ICT processes.
- The "secret" is to establish teams of young, bright, motivated people to drive each organizational ICT initiative.
- Do not rely on central funding by the University, especially for innovative ICT initiatives. Instead, establish each initiative with "a business plan intended to provide self sustainability from the start".
- Appropriate "in-house" application development capabilities have been established to rid institutions of their unhealthy dependence on the increasingly expensive multinational applications providers. This both improves their long term financial position, and increases their ability to reduce risks by piloting the latest ICT innovations.
- Important applications have been developed in-house by students and staff in collaboration, and with the students' contributions being recognised in their final assessment.

### 7.3. ICTs and Access in HEIs (Including Literacy Issues)

With few exceptions, Africa's HEIs (whether large or small, public or private) have no coordinated institutional policy or strategy for promoting ICT literacy of staff or students, let alone the needs of the general public. The lack of ICT literacy within the executive management teams of most large African HEIs may help explain this deficiency, as well as emphasizing the importance of promoting universal ICT literacy. The majority of students, irrespective of their course, put computer labs as a high priority, linking the spread of universal ICT literacy with the availability of PCs.

Most large African universities have comparatively well-equipped libraries which often established the institution's first PC labs. However, these facilities are usually restricted to providing a fairly narrow range of online information services, and were not designed to satisfy the fast growing demand, either in numbers, or for access to a wider range of services, from both the staff and student bodies. In contrast, small HEIs usually have minimal library facilities, instead providing their students with access via relationships with public HEI libraries, or via online services.

In general, large public HEIs in Africa lack sufficient network infrastructure, PC laboratories, and quality ICT instructors to provide most staff or students with adequate access. The set up, upgrade and maintenance costs are crippling most HEIs, seriously inhibiting further growth of these facilities. However, the new opportunities being offered by OSS (particularly Linux) are being recognized more widely. A common goal is to reach a PC to student ratio of 1-10 in the near future via PC labs, mostly with Internet connectivity (but of low bandwidth). Hence, although there is growing recognition in many of these institutions of the need for universal ICT literacy for all students and staff, for practical reasons ICT literacy is often only included in the curricula of a small sub-set of students where ICTs are an integral component of the course (e.g. Computer Science and Engineering).

In contrast, many medium-sized private HEIs promote ICT literacy both for staff and all students, often emphasizing e-mail which has become a major administrative/communications tool for these more cost-disciplined institutions. Most are successfully providing ICT literacy courses to their full student body, having already achieved the "reasonable" 1/20 ratio via PC laboratories which also provide Internet access. In addition, these PC labs are often made available to the general public after hours and at weekends (using a wide variety of business models, including cyber-cafes). Therefore, these medium-sized institutions are often more advanced than the larger public HEIs in the drive for universal ICT literacy, albeit for non-strategic reasons.

Small, private HEIs (often in the more remote areas) are usually struggling to provide adequate access to either staff or students. Most of their PCs are outdated, and although some small LANs have been established, very few have Internet access. Despite the lack of a strategic ICT literacy programme for staff or the wider community, ICT literacy is often a compulsory component of most courses.

National policies or initiatives to promote ICT literacy throughout broader society, including the poorest communities were not reported. However, some governments are promoting ICT access and literacy for the general public via initiatives like the promotion of school and community centre connectivity (particularly via VSAT), and the stimulation of vocational ICT training at high schools. The participants recognized that although the HEIs were not yet playing a central role in promoting universal ICT literacy into the rest of society, they should be doing so, since they arguably have the best capability. Although a few HEIs are collaborating with school connectivity initiatives (e.g. SchoolNet), generally, HEIs are not yet involved in coordinated strategic initiatives to provide the general public (particularly the poorest communities, women, and the disabled), with access to PCs and the Internet, to ICT literacy courses, or to other ICT-enhanced services.

The rarity of quality ICT training personnel is a major constraint. It is often assumed that ICT technicians can play the training role, yet their lack of teaching expertise can make this a counter-productive strategy. Concerns were raised regarding the poor quality of some of the ICT literacy training courses that are frequently used in Africa. It was also emphasized that ICT training is of little value when not quickly and regularly reinforced. The best results are said to be produced in teacher training colleges, where young potential teachers (especially science teachers) adopt ICTs much more readily. The issue of teachers (especially older teachers) acting as a bottleneck, rather than providing a “multiplier effect”, in disseminating ICT skills to the young, merits further investigation.

In general, young people (including pre-teens) assimilate to PCs and become ICT literate very much faster than adult trainees. Indeed, the best of these youngsters can extract significant value out of even the oldest machines by investigating their inner workings rather than simply using them to run the usual applications. In some cases, this experience has led to “reverse mentoring”, where ICT literate students help with the learning of ICT illiterate teachers and other adults.

**Interesting example, Kenya Technical Teachers College:** KTTC established ICT Literacy courses for *all* its students and staff in early 2002, stimulated by the discovery that the ability and desire of their students to use the Internet (from all disciplines, not just Computer Science) was generally much greater than among KTTC’s teaching staff. Hence, there is an initiative at KTTC to move beyond ICT literacy and to involve the use of PCs and the Internet in teaching ALL subjects. This initiative is changing the institutional attitude and culture toward the growing role of ICTs in all aspects of teaching and learning.

**Interesting example, JKU:** JKU is providing innovative courses aimed at the development of ICT skilled people all over Kenya in collaboration with existing institutions, progressing from certificates, through a diploma, then a degree, and even to higher qualifications. Previous rules of prior learning are being made much more flexible to encourage and prevent the exclusion of disadvantaged people. 3,000 students are now in the programme, many of whom failed maths but nevertheless are progressing well.

**Further interesting examples:**

- An HEI has established a successful 50 PC cluster/lab model, where each cluster has an independent business plan, and is solely responsible for its longer-term sustainability.
- Entrepreneurs are being invited by an HEI to run their PC labs and ICT literacy courses rather than retain them as in-house services.
- As the PC lab facilities are extended, some HEIs are off-setting their set up and running costs by opening them to the paying public as cyber-cafes after hours and at weekends.
- In several medium and small HEIs, the highest power PCs are allocated to their students with the greatest need, not to the staff on the basis of status.
- In many HEIs, International Computer Driver’s Licence (ICDL) is proving to be an effective tool for establishing ICT literacy.
- ICT literacy is high in Mauritius as it is now a compulsory component of the secondary school curriculum, with all secondary schools having PC labs.



## 7.4. ICTs and New, Indigenous Learning Materials

As yet, there do not appear to be any strategic national or regional initiatives in Africa to promote the development of ICT-enhanced indigenous learning materials, including for and by the tertiary sector. The fundamental question to be answered first is whether it is better to import learning materials (ICT-enhanced, or not) than to develop them locally? The appropriateness of imported materials for local needs should be thoroughly investigated, so that the best balance of local and **imported** content can be based on more than costs. Which materials should be imported "as is"; which should be imported, but **adapted or customized** to satisfy local needs; and which should be fully **produced locally**; and, in each case, why?

- There are serious concerns about this new, multimedia based manifestation perpetuating Africa's historical dependence on **imported learning materials**. Yet, this is countered by the fear of wasting rare local resources and time on "reinventing wheels", as well as recognizing that imported materials can be very useful for awareness creation, and that some are appropriate "as is" for certain African learners.
- Initially, **adapting or customizing** imported materials seems the most attractive "middle road", especially whilst trying to establish an indigenous capability. However, there are problems with what degrees of local adaptation (if any) are allowed by the producers (usually from the developed world), and for how long. Additionally, producing local material *de novo* is a very different process from adaptation, i.e. adaptation does not linearly lead to developing a sustainable indigenous production capability.
- Little is known to date about the **indigenous production** of new learning materials, and many people, especially those in leadership positions, do not yet recognize the importance of this capability. To stimulate awareness, demonstrations are needed in the short term of locally produced multimedia-based materials. Hopefully, as awareness grows, indigenous capabilities will develop in a positive feedback loop. Throughout, pedagogists need to maintain the emphasis on improvements to the quality of learning, rather than using the latest ICTs; and to clarify the optimal balance between imported materials and indigenous production, both in the short and longer terms.

Few, if any, of Africa's HEIs appear to have coordinated strategies to develop new ICT-enhanced learning materials. Strategically, print remains the dominant technology of distance learning (which is usually, and wrongly, equated with e-learning), and such technologies as audio, visual, the Internet, CD-ROMs and other ICTs are seldom considered seriously by the HEI executive teams. The "legitimate" path for exposing interested staff to the power of the electronic media is by digitizing their current print material for web delivery. Adapting their pedagogy to the full power of interactive multimedia must wait until (much) later. However, in almost every HEI there are a few "trail blazers" (especially in the Science and Engineering faculties) who are experimenting with multimedia-based e-learning on an ad hoc basis, usually with little or no support, recognition or reward.

The smaller, private HEIs inevitably have a more pragmatic approach to developing e-learning material. Many see electronic distance education as an opportunity to expand their student base, and hence, are experimenting with making their print material available electronically. However, many have quickly appreciated the power of CD-ROMs for their circumstances where few of their students have Internet access. CD-ROMs allow them to provide electronic material asynchronously. But CD-ROMs also allow the development of broad bandwidth, interactive material, i.e. they are ideal for exploring the power of multimedia in e-learning. Perhaps, this is why some small, private HEIs appear to be moving towards the production and use of multimedia-based e-learning materials quicker than the large public HEIs.

Several current examples of "e-learning" software platforms (both proprietary and Open Source) are being experimented with by many African HEIs, and there is even an example of such a platform that has been developed in-house. Some more experienced HEIs have decided to not yet standardize their e-learning activities on any one such platform for a range of reasons (including pedagogical restrictions, cost, youth of "e-learning", technical issues).

Many lecturers are reluctant to build the new learning materials because they are intimidated by ICTs, generally overworked, undermotivated, and have lost touch with the problems the students experience with their material. Conversely, students are keen to learn to build such material. They have many complaints



about the quality of much current print-based learning material, e.g. “a major cause of the high rate of drop-outs”. Students are not intimidated by ICTs, have fresh experience of the complexities and difficulties with the existing learning material, and are keen to collaborate in producing new material (e.g. a project or Honours thesis).

Realization is growing that there are many subject areas where locally produced (or customized) learning materials are preferable or even essential, e.g. materials that are sensitive to African cultural and linguistic issues; and a wide range of materials beyond the tertiary sector (e.g. primary, secondary, FET, ABET). Outside the tertiary sector, such local production is likely to lead to problems both over intellectual property (IP), and the need for government approval. However, lecturers in the tertiary sector have a history of producing their own material, which strengthens the case for the tertiary sector to play a major role in establishing such a national capability. Ideally, it would be best to harmonize existing programmes from several universities by collaborating to locally build appropriate new e-learning materials. But “the barriers need to come down first”.

**Interesting example, RESAFAD:** This centre provides training for teachers, educational administrators, and lecturers by employing electronic media in distance mode. They advocate developing capability locally to create locally relevant learning material, rather than importing materials from the developed world. They use a team-based learning material production process, with up to 15 team members, and they use a range of learning material development platforms, both proprietary and OSS, depending on the specific needs of each project. Their strategy is to establish a model to be replicated in the other centres throughout Africa.

**Interesting example, Instructional Technology Resource Unit, USDM:** The ITRU has recently been set up for e-learning capacity development. Significantly, the initiative recognizes the need and potential for content development to benefit learners beyond USDM:

*“It will enable the USDM to make training materials available to other institutions for education and research through publishing on the Web, through distribution of CD-ROMs and through e-mail communication.”*

**Interesting example, UNESCO:** A parallel “e-campus” project which is comparing the available ICT “e-learning” platforms has already established that commercial platforms are too expensive in the African context. Hence, the study is concentrating on Open Source Platforms.

## 7.5. Collaboration

Universities in most African countries have little power compared with their counterparts in the USA and Europe, since their governments often see them as “hot beds of opposition”, rather than growth plates and reservoirs of human capital. The perception of governments (and other stakeholders) is that the HEIs seldom communicate their ideas on major issues in a way that governments can use, ie they are failing to play a thought leadership role. Similarly, society in Africa does not expect “thought leadership” from the tertiary sector on issues they see as relevant. Africa’s HEIs are generally seen as being closed, highly compartmentalized, and without a history or culture of collaborating strategically.

Generally, the participants emphasized that a wide range of ICTs are available to HEIs (e.g. telephones; mobile devices; radio; TV; video; computer networks; the Internet; video- and tele-conferencing; electronic presentation systems; CD-ROMs; and print material). But the potential of these ICTs has not yet been strategically tapped by Africa’s HEIs, whether for access, administration, or new learning materials. They suggested several areas for potential HEI collaboration at the national level, including a shared fibre-optic network; a national electronic registration system; a country-wide virtual library system; and a growing national network of electronic distance learning centres.

In the larger public HEIs, isolated ICT initiatives are often found within different departments, rather than strategic institutional ICT initiatives. Internal procurement processes are seen to obstruct collaborative ICT initiatives.

In the larger HEIs, individuals or small groups of staff are more often involved in national and/or regional strategic initiatives than the institutions themselves. Significant barriers are still being experienced in attempts to collaborate with other institutions (not only tertiary, e.g. school connectivity initiatives). Those HEIs attempting to establish national, collaborative (outreach and other) projects have a significant concern that they become bogged down in bureaucratic processes and political complexity.

The smaller HEIs collaborate with public universities by sharing their facilities and staff, but seldom on strategic initiatives. They are seldom given the opportunity to collaborate at the national level, since their status is unclear ("looked down upon") with the public HEIs, government and other stakeholders. Yet, some smaller HEIs, because of their location and closeness to communities, are already reaching out successfully to the most disadvantaged, e.g.:

- by collaborating with the local Council in building capacity by providing ICT training services,
- by "organic growth" into nearby small towns and rural areas via small physical 'cyber-centres' and online access in collaboration with SchoolNet.

Several African HEIs are independently setting up distance learning programmes with a variety of universities and tertiary organisations in the developed world. In order to reach more potential students, some HEIs are developing models of franchising distance education courses to be managed by private sector entrepreneurs.

**Interesting example, KENET:** Kenyan Education Network, involving over 70 institutions, now provides three main educational services, i.e. content integration; network management; and web solutions, over a shared Internet infrastructure. It was established without any direct donor funding because the collaborating institutions saw enough areas of mutual benefit to act alone. Importantly, KENET's Action Plan goes beyond the tertiary sector, and includes creating connectivity for secondary and primary schools. KENET negotiated a licence with CCK, thereby becoming a private network and avoiding Telkom's high costs. This frees KENET to address the needs of all education sectors, and meetings have recently been held with Kenya SchoolNet and similar organisations to collaborate on providing this broader service.

**Interesting example, AVU:** In several countries, the African Virtual University (AVU) has succeeded in stimulating interest in and creating awareness of the potential role of ICTs (and particularly the Internet) in education, often being the first major initiative in electronic distance education. However, experience across Africa with the AVU has raised many concerns, including:

- the inadequate involvement of the host institutions in establishing AVU facilities, causing isolation and delays because of the need for faculty to understand the system, and participate in how it should be used,
- problems with the AVU's programmes and management as particularly experienced by those involved from the East African countries,
- materials produced in the USA that are proving expensive and ineffective for many African students,
- because of the dominant use of foreign lecturers, it has proved necessary (but difficult) to use local tutors to try to overcome students' cultural and language-based learning problems,
- the failure to encourage the inclusion of more local expertise, both as lecturers and ICT professionals,
- there does not appear to have been an objective approach to choosing appropriate technologies. In particular, why the emphasis on expensive video-conferencing used primarily in broadcast mode?
- the AVU's Committee of Vice Chancellors is not perceived to be close enough to these and other issues.

**Interesting example, Centre Informatica, University of Eduardo Mondlane:** ICT-driven distance education has become an integral part of Mozambique's national strategy and CIUEM has played a central role in designing and implementing infrastructure and systems, as well as appropriate learning material. CIUEM has also collaborated with the Ministry of Education, the IDRC and the World Bank in the setting up of Mozambican SchoolNet.

**Further interesting examples:**

- There are early examples of the local development of administrative ICT systems to be shared by all African HEIs. (e.g. Nairobi University has successfully developed Kenya's national HEI admission system).

- Inter-University Council of East Africa (IUCEA) is attempting to establish collaboration among both public and private HEIs throughout East Africa.
- Association of African Universities is available as a platform to stimulate strategic ICT for improved education initiatives across Africa.
- The international donor community is encouraging international collaboration focussed on strategic uses of ICTs in all aspects of education.

## 7.6. Technology Innovations

The current circumstances, policies and regulations in Africa make it extremely difficult to experiment with, let alone implement, new technologies, including ICTs. For example, regulatory problems are preventing the full potential of wireless technologies from being realized. Generally in Africa, there seems to be a lack of incentives from governments or private sector players to encourage innovative initiatives (including ICT innovations) either by HEIs or by individual academics.

Open Source Software (OSS), especially Linux, has been successfully experimented with in several African HEIs of all sizes, public and private. They are growing their OSS technical capability via such projects as reliable, low cost PC labs using Linux servers and older PCs as thin clients; user-friendly local language interfaces. Some HEIs are realizing the potential strategic organizational administrative benefits of OSS, but the development of organizational migration strategies is proving problematic, particularly concerning archival document and data processing, as well as legacy in-house developed applications. On the academic level, an ever-growing number of HEIs are starting to include OSS in their Information and/or Computer Science curricula.

There is a growing African OSS community, especially in the form of Linux Users Groups. These groups sometimes work through HEIs to spread awareness of OSS via hands-on training (eg Linux installation). In several African countries, small, local private companies are emerging to satisfy the growing demand for services based on OSS.

However, awareness amongst African leaders (public and private sectors) of the potential benefits of OSS remains low, and there is a severe shortage of quality OSS expertise throughout the continent. Under these circumstances, many OSS initiatives have been poorly resourced and coordinated, and OSS is rarely considered as a viable alternative when major ICT systems are being developed.

Participants suggested that the role of OSS in Africa's development is another major issue where HEIs should be playing a strategic "thought leadership" role. In particular they should stimulate the investigation of the need for national OSS coordinating bodies to provide accurate, objective information on OSS; promote the understanding of the philosophy behind OSS; and objectively assess the appropriate use of OSS for strategic applications.

HEIs need both to understand the issues around "buy or build", as well as spreading that understanding more widely. Throughout Africa there is a growing demand for locally produced software to satisfy local needs that are either not adequately addressed by proprietary software, or that cannot be sustainably afforded in the longer term. Addressing these needs where appropriate could have the added benefit of stimulating the development of viable, indigenous ICT industries.

Awareness needs to be created that "technology dumping" can be reversed, at least partially, in the case of ICTs. For example, old PCs can be effectively used by young ICT enthusiasts for experimentation, or even more widely as thin clients for Linux-based LANs. This could be another "thought leadership" issue.

Finally, some HEIs have been innovating with wireless technology to provide flexible, high bandwidth interconnectivity across their campuses. However, the approach has rarely been strategic, and there is again a lack of "thought leadership" to create awareness and overcome, e.g. regulatory problems.

**Interesting example, Centre Informatica, University of Eduardo Mondlane:** CIUEM has been active in almost every innovative ICT-based technology initiative in Mozambique. The distributed nature of the university within the city of Maputo required the early adoption of innovative wireless links between the various campuses as well as some other institutions (such as Ministry of Education), set up in collaboration with the CSIR in South Africa. It has established links to multi purpose community centres (MPCCs) in Manhica and Namaacha provinces, and uses OSS extensively.

**Interesting examples, USDM:** Wireless technologies have been used to link the three main university campuses with further plans to extend a wireless link to the Institute of Maritime Studies on the island of Zanzibar.

## 7.7. Conclusions

It is useful to review the above findings from two points of view:

- using ICTs for improved efficiency and effectiveness within the current paradigm;
- using ICTs to facilitate the new learning (including tertiary) paradigm for Africa.

It is clear, and quite natural, given the circumstances of most of the respondents, that the majority of the inputs fall under the “efficiency and effectiveness” header. This is certainly the area where Africa has a great deal of catching up to do, and shrinking resources with which to do it. It is also clear that most of the inputs are from the point of view of individual HEIs (or smaller units, e.g. departments, faculties, centres). Most HEIs are working individually on the same things – management/student/library information systems being a case in point. Even in the few cases where experiences are being shared that is not enough. Institutions need to share systems and content. Donor supported ICT projects in African HEIs are seldom needs driven and frequently reinforce the status quo in terms of concentration of inappropriate ICTs in urban centres, which do not contribute to the pressing needs of the majority.

Africa’s HEIs appear to be bound by archaic intellectual property right regimes. The information system tools, structures and languages to effectively enable collaborative development of reusable modular learning materials are at best in their infancy, at worst not even contemplated. Yet, these are the basis of Africa’s new tertiary paradigm, so much more is needed. UNESCO’s drive for “e-campus” in Africa must make full allowance for the fact that the history, cultures, and current circumstances of Africa’s HEIs makes it very difficult for them to collaborate holistically in addressing even the “efficiency and effectiveness” issues, let alone in creating the new tertiary paradigm.

## 8. UNESCO’s Role – Prioritized Recommendations

In chapter 2, the following comprehensive working definition of “e-campus” was presented:

*“The leadership roles that HEIs should be playing, immediately and in the longer term, by employing ICTs innovatively, efficiently and effectively to realize the goals of UNESCO’s “Education for All” initiative via a new tertiary paradigm, in “open” partnership with each other, the public sector, the private sector, civil society, disadvantaged individuals and communities (urban and rural), and the international community.”*

What should UNESCO’s “e-campus” vision and strategy be in the light of this definition and the findings in this report? Clearly, “e-campus” needs to be driven as a major paradigm change at global, regional, national, institutional, and individual levels. Arguments have been presented in earlier chapters that this necessitates the massification of education at all levels, including tertiary. The current education systems in the developing world cannot be scaled-up to reach all the potential learners, particularly the most disadvantaged who mostly populate the remote and rural areas, and make up the “unheard and invisible” majority of that population. Hence, to achieve “Education for All” requires massification, which in turn requires the adoption of a new

learning/teaching paradigm. Such massification within the context of the new paradigm can only be achieved via the appropriate use of ICTs. And the appropriate use of ICTs is very different (more exciting but less “routine” and “safe”) than the traditional “efficiency and effectiveness” approach, and the associated incremental changes to the existing paradigm.

## 8.1. Emerging Model of “E–Campus” in Africa

The findings in this study support the widely held view that the world’s education systems are dominated by inflexible structures and processes, e.g. centralized building complexes (often of historical importance, but seldom positioned optimally); traditions; organizational structures; curricula; examinations. If “e-campus” is employed within the confines of this paradigm, the ICTs are likely only to reinforce the rigidity and embed the past. However, if our attention is turned away from rigidity, and toward the primary source of flexibility, i.e. the ideas of knowledgeable and concerned people both within and beyond the tertiary sector, then ICTs can play a dramatic and wide-ranging supporting role in creating a future learning paradigm that embraces the needs of everyone on the planet, including the poorest in Africa. This paradigm begins to paint a very different picture of Africa’s “e-campus”, and begs a range of searching questions.

### *Should each individual HEI build its own version of “e-campus” in isolation?*

Today’s HEI campus is where the rigidity is greatest, yet it is also where many of Africa’s most knowledgeable and creative people are to be found. UNESCO will achieve little by supporting the current trend of developing “e-campus” as isolated ICT-based extensions of the existing inflexible structures and processes of each HEI. Yet, it is essential to have the active involvement of the creative, knowledgeable people within the HEIs to collaborate in building a much more far-reaching model of “e-campus”.

### *Should a particular HEI in each country be designated as the sole, national “e-campus”?*

In some cases this is being done, with an existing correspondence-based distance education institution being seen as the “natural” first choice. This is a counter-productive strategy, because it not only reinforces the discredited differentiation between “contact” and “distance” education, but it also hinders the creative use of ICTs for enhanced learning across a growing spectrum of modes from being experimented with and developed by all HEIs.

### *Should all public HEIs in a country collaborate in driving the creation a national “e-campus”?*

Although this appears at first to be the best strategy, history mediates against it. Whether at the provincial, national or regional levels, Africa’s HEIs have not collaborated well as institutions. UNESCO should promote “e-campus” as a multiorganizational collaboration, where the HEIs as institutions play a supporting rather than a driving role. Leadership should come from a separate executive authority, with the HEIs providing crucial support by making available to “e-campus” their facilities and their staff, particularly their “e-campus” champions.

### *Should local private HEIs be invited to collaborate in forming a national “e-campus”?*

Africa’s private HEIs are usually smaller than their public counterparts, and tend to focus on providing courses with the best income-generating potential. Hence, they usually cater for elite students, rather than focus on the tertiary needs of disadvantaged communities. However, many of them appear to be using ICTs much more efficiently and effectively than the public HEIs, and have achieved much more widespread ICT literacy and access for their students and staff, and even the general public. In addition, their smaller size presents a model which appears to hold significant promise for “e-campus”, particularly in reaching potential students outside the main metropolitan areas. Hence, Africa’s private HEIs should be included in the “e-campus” initiative at both the national and international levels. To assist with the latter, UNESCO could immediately facilitate the establishment of an African Association for Private HEIs.

### *Should other local organizations be invited to contribute to the formation of a national “e-campus”?*

The perceptions are that Africa’s HEIs are isolated and out of touch with society. In particular, the local private sectors wish their learning materials were more relevant and up to date so that graduates were of more immediate use to economic activity. Innovation also needs to be greatly stimulated throughout the continent, and a closer relationship between HEI research and indigenous economic development and entrepreneurship



is thought to be crucial. Hence, if "e-campus" is to have the required impact on African society, local private sector and other organizations should be actively involved in its development.

***Should "e-campus" have a dimension beyond the national level, i.e. regional and continental (even global)?***

As suggested above, "e-campus" needs to be a multiorganizational collaboration, involving a range of parallel initiatives. Although collaboration at the national level is likely to be important, multinational collaboration is likely to become a major component. This will allow Africa to share a wide range of associated benefits, including standardized accreditation, shared learning material (where appropriate), shared infrastructure, and shared administrative ICT systems.

***Should "e-campus" impact on all levels of the education system?***

The new learning paradigm behind "e-campus" emphasizes that the tertiary sector should not be seen in isolation, but as the hub of the transformation of all levels of education and life-long learning. In particular, quality, relevant learning material is needed at all other levels of the education system to create a healthy flow of students through to the tertiary system. Although under great pressure, Africa's tertiary sector still has greater infrastructure, facilities, capacity and capabilities than any other component of the public education system. The shared infrastructure, shared administration systems, shared sources of new learning materials, etc. should benefit the whole education system, not just the tertiary sector. In other words, "e-campus" should stimulate a coherent e-system, including e-preprimary, e-school, e-ABET, e-FET, and e-informal education.

***Should Africa's "e-campus" involve partnerships with public and private HEIs in the developed world?***

Africa needs to take advantage of and benefit from the wide ranging expertise and experience of both individuals within developed world HEIs, as well as the institutions themselves. Areas for potential collaboration might include administrative systems, latest technologies (especially OSS-related), and a variety of collaborative research initiatives. However, partnership is very different from patronage, where education practices common in the developed world are blindly copied (or imposed) in Africa without due consideration of local needs and circumstances. The "e-campus" model emphasizes equitable partnerships within which African HEIs should reverse the current trend of becoming "second class satellites" of developed world institutions, losing independence, losing highest quality staff, and neglecting the production of locally relevant learning materials.

***Should "e-campus" reach the poorest and most remote populations?***

Bringing poor individuals to residential campuses changes their lives but leaves their communities essentially unchanged, contrary to the spirit of Education for All. Alternatively, by providing access to "e-campus" within remote and disadvantaged communities, the exclusion of the whole community, rather than an individual, is broken, and a growth plate is established on the shoulders of quality, relevant education.

***Where should the physical component(s) of "e-campus" be?***

It has been argued above that "e-campus" should not be seen as a sub-set of an individual HEI. Rather, every HEI (public and private) should contribute to the national/regional "e-campus" initiative by allowing its facilities and staff to be shared. In addition to the HEIs, other relevant institutions, especially in the most remote areas, should make their facilities and staff available, e.g. schools, MPCCs, post offices, etc. A resultant benefit would be that compatible, broad bandwidth ICT infrastructure would not only be shared by the HEIs but also by all other institutions contributing to "e-campus", on the basis of their contribution to a national/regional resource, perhaps with a special regulatory status (this builds on the excellent KENET model).

***How should "e-campus" be funded?***

This is a crucial issue. If "e-campus" is expected to grow out of existing national or HEI budgets, it is very unlikely to make a significant impact. Instead, these budgets must be left much as is, otherwise most HEIs will see "e-campus" as a threat. "E-campus" needs to be recognized as a separate national/regional initiative to create a new paradigm, and therefore should be funded via alternative revenue streams. African national budgets are too stretched to afford this new burden. Hence, the international community needs to be convinced that this is a major opportunity for effectively donating to and investing in Africa. Likewise, private sector investment should be solicited on the basis that the provision of quality education throughout Africa is both a major new market in itself, but will also stimulate in the longer term the development of many new markets among Africa's hundreds of millions who to date have been excluded from the global economic and education systems.



***How should the administrative systems of “e-campus” be developed?***

The model is of a shared, networked environment being created “across”, in parallel, and in addition to existing HEIs. Current HEI systems are not designed for the “e-campus” concept, and it would be unwise to expend large amounts of time, energy and money on trying to massage these (usually proprietary) electronic systems to fit the new concept (new concepts often become unrecognizably distorted by this process). Instead, new, compatible, standardized systems need to be developed as “e-campus” evolves and grows. The obvious administrative systems (HR, Finance, registration and admissions, document management, etc.) would provide excellent starting points. The systems development processes should also be “shared” or collaborative across all HEIs involved (and involving other stakeholders). It is difficult to see how proprietary systems could be used successfully in this model, which lends itself to the well established collaborative development processes used for open source systems.

***How should universal access to “e-campus” be provided and maintained?***

This requires both physical access to ICT infrastructure (PCs, the Internet, appropriate software), and widespread ICT literacy throughout Africa, especially in the most remote and rural areas. Again, “e-campus” should not build its own, independent access points, but instead should share (and by sharing contribute to the sustainability and roll out of) existing access facilities being set up, e.g. by national MPCC initiatives, school connectivity (SchoolNet) initiatives, kiosks, and other remote connectivity initiatives. Again, the cost effectiveness and reliability of OSS (“Linux labs”) solutions should be considered at every opportunity. And the use of local students for first line ICT maintenance, support and ICT literacy training should be considered.

***How should the new learning material at the heart of “e-campus” be created?***

Individual subject specialists digitizing their lecture notes and making them available on the web is neither part of the new tertiary paradigm nor “e-campus”. Instead, teams of multidisciplinary experts (including subject specialists, pedagogists, instructional designers, ICT and multimedia specialists, language and culture specialists, learner support specialists, and representatives of the learners themselves) should form the “e-campus” mechanism for the ongoing creation of a wide range of interactive, multimedia-based e-learning materials. These teams should work on a project basis in both real and virtual modes, coordinated from a national centre for ICT-enhanced indigenous learning material. These centres should both stay abreast of and contribute to relevant global research (e.g. learning objects, self-monitoring environments, etc.) as well as ensuring that learning material is sensitive to local issues (e.g. language and culture). A network of these centres should be developed throughout Africa, as an integrating driving force of “e-campus”. It would be counter-productive if such centres were to be owned or situated within a single HEI, although all HEIs (public and private) in a particular nation should be encouraged to contribute to their development and outputs.

***How will “e-campus” evolve and grow?***

Clearly, the concept of “e-campus” described here involves a major African initiative which will take many years to unfold. However, there are several aspects which need to be started immediately, and run in parallel within the boundaries of a shared vision of what “e-campus” can become. That shared vision needs to be finalized, and awareness and buy-in established throughout all stakeholder groups at the international and national levels. A set of strategies needs to be developed for the various parallel activities needed in several countries (see below for more details). Significant support and funding (short- and longer-term) has to be gained from the international community (including UNESCO!). The idea is to initiate a series of processes which are mutually beneficial to the many players involved, and which in turn stimulate multiple internal positive feedback loops, i.e. “organic growth” as “e-campus” reaches out to include every community and individual in Africa.

The above questions and discussion highlight common activities which are currently taking place and could fall under the label of “e-campus”, but which run contrary to the concept of “e-campus” proposed here. Therefore, ***UNESCO should actively avoid and discourage*** initiatives which:

- assume that the prevalent “talk and chalk” pedagogy is, and will remain, the only appropriate pedagogy for Africa;
- reinforce the prevalent elitist paradigm of HEIs, contrary to the need to reach 100,000s of potential tertiary students throughout Africa with quality learning (massification);
- use ICTs at a sub-institutional level (e.g. departmental, centre, faculty) to address their immediate

needs in isolation, irrespective of the often negative impact on the broader institution, and the national tertiary sector;

- use ICTs to promote the competitiveness of one HEI against others (usually within the same country). In effect, they are competing for the money of the elite parents of privileged students. This often results in the adoption of “flashy” technology (usually without considering pedagogical issues) rather than appropriate technologies, which usually leads to increased costs and makes the institution even more exclusive to the country’s potential students in disadvantaged areas;
- increase the dependency of an institution or a country on a particular proprietary ICT hardware, system, application or service;
- promote the use of one particular technology in exclusion of the wide variety already available, and those that will soon become available;
- misrepresent inappropriate forms of ICT-enhanced distance education as being compatible with the desired massification, e.g. real time broadcast of lectures.

## 8.2. Recommendations

UNESCO needs to develop a viable short-and longer-term “African ‘e-campus’ Strategy” which presents a coherent set of nested, fractal initiatives at the continental, regional, national, provincial, organizational, community, and individual levels. The following recommendations are suggested as a basis for such a strategy.

*At the highest level (continental, regional, national) it is suggested that UNESCO should:*

- Play the primary, ongoing supra-national role in establishing an African capability to drive “e-campus” (with both a physical and virtual component). However, UNESCO should seek active partnership with the international donor and development communities, as well as foundations and, where appropriate, the private sector (local and international).
- Identify, nurture and gain the active support of ICT knowledgeable champions (or potential champions) in powerful or influential positions in both the public and private sectors in Africa. Such champions can be used to create expert working groups to run the many initiatives that the “e-campus” concept requires.
- Use these champions to quickly establish a robust, broad, and coherent concept of an African “e-campus” in line with its “Education for All” drive.
- Popularize and gain legitimacy for this concept via a wide range of awareness creation and consensus-building initiatives throughout Africa (e.g. expert papers, workshops at several levels, electronic discussions, “thought leadership” documents, videos, tapes, CDs).
- Recognizing the crucial role innovation must play in the development of “e-campus”, create awareness, particularly within African governments, that there need to be incentives from governments and/or private sector players to encourage innovative initiatives (including ICT innovations) by HEIs, individual academics, and other stakeholders.
- Stimulate and facilitate important “e-campus”-related African initiatives and research that might otherwise not happen due to Africa’s range of disadvantaged circumstances.
- Facilitate the development of high level African “e-campus” policies and strategies (at the regional and national levels), recognizing: their dynamic nature (amplified because ICTs are involved); that this should be an ongoing process, not a “one-off” event; and that more should be done to ensure their general ownership throughout all levels of African society.
- Facilitate the development of appropriate guidelines for coherent national and institutional “e-campus” policies and strategies.
- Immediately commission several high level investigations essential for the establishment of an African “e-campus”, including:
  - What proportion of Africa’s future expenditure on ICT-enhanced open education (both running costs and investment in development) should be borne by government; various categories of learners; private sector; international agencies; and others? Should “e-campus” be seen as an additional, multinational initiative with separate funding?
  - Africa-wide accreditation mechanisms are needed not only for ICTs, but also for most other

disciplines, especially in the context of “e-campus”. How should the need for standardization of tertiary education both within African countries, as well as across the continent, be addressed?

- A study is needed of the comparative roles of government, the HEIs, and the private sector in the establishment of universal ICT literacy, especially in the most remote areas, and emphasizing the potential contributions of school connectivity and MPCCs.
- The issues around “buy or build” in Africa where there is a growing demand for locally produced software to satisfy local needs that are either not adequately addressed by proprietary software, or that cannot be sustainably afforded in the longer term. Addressing these needs, where appropriate, could have the added benefit of stimulating the development of viable, indigenous ICT industries.
- The potential major positive feedback loops between Africa’s small indigenous ICT industries, and the African HEIs and other R&D institutions. Currently, there is little strategic interaction between these important sectors of African society, yet there is the opportunity to help stimulate the development of significant indigenous ICT capabilities and industries by implementing “e-campus”.
- Promote the establishment of national centres (with real and virtual components) throughout Africa to develop a sufficient capability and capacity for the creation of a wide range of ICT-enhanced, multimedia-based, multimodal indigenous learning materials.
- Stimulate the development and adoption of tools, facilities and licenses which support, enable and promote the *collaborative processes* required to create new learning material which can be freely shared. Generally, Africa cannot afford to develop new learning material in any other way. This echoes the World Bank’s 2002 report on Constructing Knowledge Societies which recognizes this need and makes strong recommendations regarding Promoting an Enabling Framework for Global Public Goods.
- Promote the establishment of an African Association of small, (usually young), private HEIs, as discussed at the 2002 conference of the African Association of Universities. They are important sources of dynamism, innovation and alternative models in Africa’s tertiary sector, and their current and future contributions to “e-campus” should be coordinated and encouraged via this Association.
- Stimulate a range of collaborative initiatives at the national and regional levels to develop ICT infrastructure and compatible administrative ICT systems to be shared by all African HEIs, as well as the wider community involved in developing the “e-campus” network across Africa.
- Promote the potential benefits of OSS (both the technology and the philosophy) in the African education context, perhaps by establishing a multinational team of African and global experts from several sectors of society.
- Facilitate the establishment of, and provide ongoing support to national OSS coordinating bodies throughout Africa which will provide accurate, objective information on OSS; promote the understanding of the philosophy behind OSS; and objectively assess the appropriate use of OSS for strategic applications.
- Comprehensively and regularly monitor “e-campus”-related activities throughout Africa.
- Establish an African “e-campus” web environment providing a variety of services related to “e-campus”. A start could be made by publishing this report on the web, and enabling visitors to make a variety of inputs on an ongoing basis leading to regular reviews and updates of the report. This web environment could also play the role of gathering best practices; stimulating, facilitating and maintaining relevant debates and other strategic group learning processes; and promoting appropriate emerging open standards.

***At the level of individual and groups of African HEIs (and without conflicting with the above high level recommendations), UNESCO should promote, facilitate, coordinate, and/or integrate initiatives which:***

- Promote ICT literacy (and other forms of literacy) amongst staff, students, and the broader population. This should be a major short-term goal of “e-campus”, in support of which HEIs could:
  - agree that ICT literacy is a basic requirement for both staff and students, progressing from the previous view that it is a skill for specialists;
  - provide incentives to encourage staff to become ICT literate, and to acquire their own PCs;
  - encourage universal ICT literacy, so that in future their students will be ICT competent before they arrive at University;

- establish ICT literacy in remote communities, helping HEIs to become more “in touch” with and relevant to these poorest areas;
- play a central role in establishing urgently needed monitoring and standardization safeguards to overcome the poor quality of many of the ICT literacy training courses that are frequently used in Africa, as well as “junk ICTs” being distributed, particularly to schools.
- Promote access by all staff and students to PCs, e-mail, the Internet and web, and educational electronic services (e.g. digital libraries, etc.).
- Support the tertiary sector in developing generic guidelines on how to establish and manage an appropriate range of ICT facilities (for access, administration, and new learning materials), especially at young, growing African HEIs.
- Encourage, in the short term, small teams wishing to create indigenous ICT-enhanced learning material (probably, including subject specialists, instructional designers, ICT practitioners, language experts, cultural specialists, learners, etc.), thereby kick-starting the “learning by doing” process. A variety of incentives to individuals and institutions are needed, and should be specified in national and institutional policies.
- Encourage HEIs to see their students as a valuable resource in the context of “e-campus”, for example by:
  - Using 3<sup>rd</sup> year students to support 1<sup>st</sup> year students with studies;
  - Using ICT literate students to provide first level ICT support and maintenance, as well as ICT literacy training, especially at remote and rural access points (e.g. MPCCs, and connected schools);
  - Encouraging final year undergraduate students to work on new, indigenous learning material for their projects.
- Encourage tertiary organizations to investigate, spread awareness of, and harness the growing potential of ICTs to address the development needs of their societies (local, regional, national and continental), both in the form of initiatives aligned with national imperatives, as well as active exercises in thought leadership to guide and partner government.
- Encourage tertiary organizations to make available (second?) motivated staff with relevant expertise to contribute to national/continental strategic ICT initiatives, including “e-campus”.

## Details of National Study Tours

### A.1. Full List of Participants/Interviewees in “E–Campus” Study

#### A.1.1. Senegal, 29/01 – 01/02/2003

Bacari, Secretary, Students Representatives Council, Université Cheikh Anta Diop de Dakar  
Dr Boubaker Barry, Head, ICT, Université Cheikh Anta Diop de Dakar  
Dr Amadou M Camara, Administrateur du Site; Université Virtuelle Africaine (AVU, Dakar)  
Dr Papa Youja Dienj, CEO, RESAFAD, Dakar  
Modou Fall, Université Cheikh Anta Diop de Dakar  
Samba Guisse, National Coordinator, World Links Senegal, Dakar  
Marie-Helene Mottin-Sylla, Enda-synfev: environnement et developement du tiers-monde; Dakar  
Dr El Hadji Issa Sall; President and CEO, Université du Sahel, Dakar  
Madame Fatimata Seye Sylla; Directeur General, Solutions 3+, Dakar  
Dr J. Habib Sy, Executive Director, Aid Transparency, Dakar  
Theo, President, Students Representatives Council, Université Cheikh Anta Diop de Dakar

#### A.1.2. Ghana, 01/02 – 07/02/2003

Asare-Darkwa Abel, Gimpa, Greenhill, Accra  
Michael Aboagye, GIMPA, Greenhill, Accra  
Theodosia Adanu, Balme Library, University of Ghana, Legon  
Sabra Asante, SAMC Ltd, Accra  
Abraham Asante-Obeng, Community Service Foundation, Tema  
Hubert Asior, GIMPA-DLC, Greenhill, Accra  
Vivian Attah, GIMPA-DLC, Greenhill, Accra  
Sophia Awortwi, Ministry of Education, Accra  
Prof. J.S. Ayim, Kwame Nkrumah University of Science and Technology, Kumasi  
Darkwa Saffu Boateng, GIMPA, Greenhill, Accra  
S. Boye, School of Administration, University of Ghana, Legon  
Abraham Brew-sam, Kwame Nkrumah University of Science and Technology, Kumasi  
Isabella Buagbe, NFED, Accra  
Perpetua Dadzie, Ashesi University, Cantonment, Accra



Thomas Dennen, Campus Crusade Great Commission Movement, Orlando, Florida, USA

Kofi de Heer-Menlah, ICT Director, GIMPA, Greenhill, Accra

Allen Marvin, GIMPA-DLC, Greenhill, Accra

Prof. R.K. Nkum, Kwame Nkrumah University of Science and Technology, Kumasi

Faustina Noye, Methodist University College, Dansoman, Accra

S. Odartley-Wellington, GIMPA, Greenhill, Accra

Larry Odonkor, Kwame Nkrumah University of Science and Technology, Kumasi

Kwasi Opong, Community Service Foundation, Tema

Julius Richardson, Kwame Nkrumah University of Science and Technology, Kumasi

Prof. K. Sing, Kwame Nkrumah University of Science and Technology, Kumasi

Edward Tetteh, Accra Academy School, Accra

Prof. Tim Unwin, Imfundo/DFID, London, UK

Eric Yankah, African IT Education Trust, Volta River Authority

#### **A.1.3. Ethiopia, 10/02 – 13/02/2003**

Lishan Adam, Consultant, ICT for Development, Addis Ababa

Ben Akoh, CEO, ICT Consultancy, Addis Ababa

Yikirta Alemu, Director, ICT Dept., Unity University College, Addis Ababa

Abebe Chekol, Programme Director, ICT, British Council, Addis Ababa

Dr Fay King Chung, Director, IICBA, Addis Ababa

Geunther Cyranek, ICT Advisor, UNESCO, Addis Ababa

Peter da Costa, Chief Advisor, UNECA, Addis Ababa

Dr Ahmed Hussein, Director, Hilcoe School of Computer Science and Technology, Addis Ababa

Yared Kiflom, ICT Advisor, UNDP, Addis Ababa

Atsushi Matachi, Project Coordinator, IICBA, Addis Ababa

Joseph N.Ngu, Deputy Director, IICBA, Addis Ababa

Dr Patrick Yalokwu, Civil Service College, Addis Ababa

Prof. Habtamu Zewdie, Addis Ababa University and AVU, Addis Ababa

Marew Zewdie, Programme Officer, IICBA, Addis Ababa

#### **A.1.4. Kenya, 20/02 – 23/02/2003**

Hezekiel Dlamini, ICT Advisor, UNESCO, Nairobi

Florence Etta, Senior Program Officer, IDRC, Nairobi

Wilfred N Gichuki, Chief Principal, KCCT, Nairobi  
Ms A. Janssens-Bevernage, Coordinator, WOB learning resource, KCCT, Nairobi  
Gabriel K. Kago, Chairman, Kenya Information Society, Nairobi  
Dr Meoli Kashorda, Dean, School of Business, United States International University, Nairobi  
John Lilech, University Librarian, United States International University, Nairobi  
Dr J.M. Odote, Director, Kenyatta Virtual Learning Ltd., Kenyatta University, Nairobi  
Dr Fred Okono, Asst Director, and Dean, Technical Institute Starehe Boys Centre, Nairobi  
Leonard M. Oloo, Senior Lecturer and Coordinator e-learning, KCCT, Nairobi  
Caroline Pontefract, Programme officer, Imfundo/DFID, London, UK  
Prof. Henry Thairu, Chairman of the Management Committee, KENET, Nairobi  
Prof. Tim Unwin, Head, Imfundo/DFID, London, UK  
Prof. Tim Waema, IT Coordinator, Nairobi University, Nairobi

**A.1.5. Uganda, 23/02 – 26/02/2003**

Ronald Amanyice, Christian University, Mukono  
Sylvester Dickson Baguma, Head, Computing and IT, Nkumba University, Entebbe  
Venansius Baryamureeba, Director, Institute of Comp Science, Makerere University, Kampala  
Godfrey Ddumba, Interviewer, Radio Uganda, Kampala  
Michael Kityo Galiwango, PIT, consultant, Kampala  
Daniel Kakinda, Head, SchoolNet Uganda  
Jmaes K. Kalebbo, Director, Uganda Management Institute, Kampala  
Ayub Golooba Kalema, World Bank, Special Projects coordinator, SchoolNet Uganda  
Sharon Kagimo, Intern, UNDP, Uganda  
David Kalanzi, Uganda National Commission for UNESCO, Kampala  
Vincent Michael Kiberu, Uganda Christian University, Mukono  
Emmanuel Kiiza, Lecturer, Namasagali University, Kampala  
Vincent Kisenji, Uganda Christian University, Mukono  
Richard Matouu, SchoolNet Uganda  
Mr H.K. Matovu, Acting Dean, Computer Science, Namasagali University, Jinja  
Prof. P.E .Mugambi, Makerere University, Kampala  
Joshua Mugambwa, Registrar, Namasagali University, Jinja  
Ivan Mugisha, Head dept, Computer Science, Namasagali University, Jinja  
Humphrey Mukooyo, Senior Information Scientist, Ministry of Education and Sports, Kampala

Ms Anastasia Nakkazi, Secretary General, Uganda National Commission for UNESCO, Kampala

Semuanga N. Njuki, Bugema University, Kampala

Martin Nsubuga, Uganda National Commission for UNESCO, Kampala

Daniel Stern, Director, Uconnect, Kampala

Prof. F.F. Tusubira, Director, ICT Support, Makerere University, Kampala

Wilfred Tusubira, Training Coordinator, Uganda Global Distance Education Centre, Kampala

Fred Wagabaza, Coordinator, Namasagali University, Jinja

## A.2. Template for "E-Campus" Interviews

At each stage, check what documentation is available (preferably electronic, but hard copy is better than nothing).

### *Background information of Institution/interviewee:*

When established?

Size, number of students, staff? Number of campuses?

Contact and distance initiatives? Text or electronic?

### *How is ICT handled?*

ICT Executive?

Policy(ies)? Copies of documents?

Strategy(ies)? Copies of documents?

### *ICT Literacy:*

Staff

Students (e.g. PC labs in residences)

Society

### *ICTs and Administration:*

Current status (any examples of good/best practices?)

Future ICT initiatives (ideal vs probable)

Maintenance of what exists vs creation of future

Barriers and challenges

***ICTs and Access:***

Current status (any examples of good/best practices?)  
Involvement with School Connectivity (e.g. SchoolNet)?  
Collaborative Learning and student support- e-facilitated (examples?)  
E-library services  
Future ICT initiatives (ideal vs probable)  
Maintenance of what exists vs creation of future  
Barriers and challenges

***ICTs and New Learning Materials:***

Current status (any examples of good/best practices?)  
Course offered and technology used:

- e.g. print, fax, phone (cell phones?), Internet, audio cassettes, radio, video cassettes, audio- and/or video-conferencing, TV, satellite (V-Sat? – broadcast or interactive?), CD-ROM, computer labs...

Future ICT initiatives (ideal vs probable)  
Maintenance of what exists vs creation of future  
Barriers and challenges

***ICT related Collaboration:***

Within institution  
Between institutions (both tertiary, and other, e.g. with school connectivity initiatives)  
At provincial/national level  
At international level  
Wider than tertiary material:  
teacher training, ABET, FET, primary, secondary, informal, corporate, community development...?

***Special ICT Challenges/Opportunities:***

Wireless  
Open Source

### A.3. Template for "E-Campus" Workshop Agendas

Venue:

Time: 08.15–14.00

1. Welcome and administration issues ~ 5 mins: Local dignitary
2. Discussion of the programme for the morning... ~ 5 mins: Dr Bob Day
3. Participants introduce themselves, especially their ICTs and Higher Education experiences and interests (see context document) ~ 2 mins per delegate  
~ 30 mins in all
4. ICTs and the Tertiary sector in Africa. An overview of some challenges and opportunities... ~ 25 mins: Dr Bob Day
5. 20 mins discussion  
*Tea Break (about 10.45)*
6. Group discussion(s) concerning the following three areas:
  - ICTs and HEI administration (includes policy and strategy issues);
  - ICTs and access to HEIs (includes literacy issues);
  - ICTs and new, indigenous learning materials
 ~ 40 mins  
  
 Under each of these themes the group(s) should discuss:  
 where their organisation(s) is are;  
 where, ideally, they would like to be;  
 constraints and challenges
7. Report backs to the plenary group (if breakaway groups used) ~ 30 mins
8. Plenary group discussion of "collaboration" at the provincial, national, and international levels. Provide examples identifying both "barriers", and "best practices" ~ 20 mins in all
9. Plenary group discussion of Technology Visions, including Open Source philosophy and s/w, Wireless, and other hot topics ~ 20 mins in all
10. Final "wind-up" and general appreciation of contributions ~ 10 mins in all

## Acronyms

AAU	Association of African Universities
AAU	Addis Ababa University (Ethiopia)
ABET	Adult Basic Education and Training
AIDS	Acute Immuno-Deficiency Syndrome
AISI	African Information Society Initiative
ARIS	Academic Register Information System
AUF	Agence Universitaire de la Francophonie
AVU	African Virtual University
BSD	Berkeley Standard Distribution (of Unix)
CBE	Computer-Based Education
CBT	Computer-Based Training
CCK	Communications Commission of Kenya
CD-ROM	Compact Disc – Read Only Memory
CEO	Chief Executive Officer
CIO	Chief Information Officer
CITS	Centre for Information Technology and Systems (Mauritius)
CIUEM	Centre Informatica Universidade Eduardo Mondlane
COL	Commonwealth of Learning
CSIR	Council for Scientific and Industrial Research (South Africa)
EFA	Education for All
EMA	Educational Media Authority (Ethiopia)
EML	Educational Mark-up Language
EMUNET	Eduardo Mondlane University Network
ENS	Ecole Normale Superieure
ESLCE	Ethiopian School Leaving Certificate Examination
ETC	Ethiopian Telecommunications Corporation
FAQ	Frequently asked Questions
FASP	Fonds d’Appui au Secteur Prive
FET	Further Education and Training
FIS	Financial Information System (UDSM)



GDP	Gross Domestic Product
GIIT	Ghana Institute of Information Technology
GIMPA	Ghana Institute of Management and Public Administration
HE	Higher Education
HEI	Higher Education Institute
HIV	Human Immuno-Deficiency Virus
HLHR	High-Level Human Resources
ICDL	International Computer Driver's License
ICT	Information and Communications Technology
IDRC	International Development Research Council (Canada)
InfoDev	Information for development project (World Bank)
IP	Intellectual Property
IP	Internet Protocol
ISETT	Information Services, Electronics and Telecommunications Technologies
ISP	Internet Service Provider
IT	Information Technology
ITP	Institutional Transformation Programme (UDSM)
ITRU	Instructional Technology Resource Unit (UDSM)
IUCEA	Inter-University Council of East Africa
JKU	Jomo Kenyatta University (Kenya)
Kbps	Kilobits per second
KENET	Kenya Education Network
KIS	Kenyan Information Society
KNUST	Kwame Nkrumah University of Science and Technology (Ghana)
KTTC	Kenya Technical Teachers College
LAN	Local Area Network
LOR	Learning Objects Repository (Mauritius)
Mbps	Megabits per second
MCI	Formerly 'WorldCom', the USA's 2nd largest telco.
MIS	Management Information Systems
MISA	Maitrise en Informatique et Statistique Appliquees
MIT	Massachusetts Institute of Technology (USA)
MOU	Memorandum of Understanding

MPCC	Multi-Purpose Community Centre
NCB	National Computer Board (Mauritius)
NCHE	National Council of Higher Education (Uganda)
NEPAD	New Partnership for African Development
NGO	Non-Governmental Organisation
NIIA	National Information Infrastructure Agenda (Uganda)
NICI	National Information and Communications Infrastructure
NITSP	National IT Strategy Plan (Mauritius)
NORAD	Norwegian Agency for Development Cooperation
NPHE	National Plan for Higher education (South Africa)
NUST	National University of Science and Technology (Zimbabwe)
ODL	Open and Distance Learning
OKI	Open Knowledge Initiative
OSS	Open Source Software
OUT	Open University of Tanzania
PC	Personal Computer
PHP	PHP: Hypertext Preprocessor (a recursive acronym)
R&D	Research and Development
RESAFAD	Le Reseau Africain de Formation a Distance (Senegal)
SAFE	South Africa Far East link
SAITIS	South African Information Technology Industrial Strategy
SAUVCA	South African University Vice Chancellor's Association
SETA	Sector Education and Training Authority (South Africa)
SIDA	Swedish International Development Agency
SIDA-SAREC	The department for Research Co-operation within SIDA
TENET	Tertiary Education Network (South Africa)
TEIL	Technology Enhanced Independent Learning (UDSM)
UCC	University Computing Centre (UDSM)
UDSM	University of Dar-es-Salaam
UEM	Universidade Eduardo Mondlane (Mozambique)
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme

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UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Education, Social and Cultural Organisation
UNFPA	United Nations Population Fund
UNINET	University Network (South Africa)
UNISA	University of South Africa
USA	United States of America
USAID	United States Agency for International Development
USIU	United States International University
VANS	Value-Added Network Services
VCILT	Virtual Centre for Innovative Learning Technologies
VOIP	Voice Over Internet Protocol
VSAT	Very Small Aperture Terminal
WebCT	Web Course Tools
WSIS	World Summit on the Information Society
WTO	World Trade Organisation



**Philip Ouma Ayoo**  
The Inter-University Council for East Africa  
*Uganda*

**A NATIONAL DISTANCE EDUCATION (DE)  
SOLUTION FOR UGANDA:  
INNOVATIVE APPLICATION OF DIGITAL ICTs  
TO OVERCOME THE BARRIERS OF THE EXISTING  
DIGITAL DIVIDE**

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## 1. Introduction

In Uganda, like everywhere else in Africa, higher education is currently faced with great challenges and difficulties related to financing, surging numbers of students in the face of insufficient resources, equity of conditions at access into and during the course of studies, improved staff development, enhancement and preservation of quality in teaching, research and services, and relevance of programmes. At the same time, higher education is being challenged by new opportunities relating to technologies that are improving the ways in which knowledge is produced, managed, disseminated, accessed and controlled.

In order to open up and widen access to education to the public, a number of education institutions in Uganda are currently establishing a distance education (DE) component in their programmes. It continues to be realized that, in contrast to college-based training, distance programmes have the potential to provide access to learning opportunities on a wider geographical reach and a larger scale. This is of particular value in reaching underserved areas or target groups, which might otherwise have little access to the regular educational system. It can overcome regional differences in access to education and open up access to learners, particularly women, with family and income-generating commitments, and who need to remain in their communities.

In this document, an attempt has been made to examine and propose a national DE strategy for Uganda that incorporates innovative application of ICTs to overcome the digital divide. This has been done by looking at the following areas:

- i) current situation of HE in the country;
- ii) barriers or constraints pertaining to technology-enhanced DE;
- iii) proposals for the future of technology-enhanced DE.

## 2. Current Situation of Higher Education

The education system in Uganda covers eight years of primary (basic) education, four years of ordinary level secondary education, two years of advanced level secondary education, and two–five years of tertiary education. Alternative tracks branch off from ordinary level secondary to technical colleges and primary teachers colleges. Tertiary education covers post-advanced level secondary education; this sector includes universities and other institutions of higher learning such as polytechnics.

### 2.1. Number of Universities

The tertiary education sub-sector encompasses fifty-seven licensed institutions in the following categories:

- 4 public universities,
- 12 private universities,
- 10 national teachers' colleges,
- 5 technical colleges,
- 5 colleges of commerce,
- 5 agriculture and animal husbandry institutions,
- 1 forestry college,
- 2 cooperative colleges,
- 1 hotel and tourism institute,
- 4 medical/health sector institutes,
- 2 vocational institutes,
- 2 weather/earth institutes,
- 3 management institutes.

Added to these are nine universities and twelve non-university unlicensed tertiary institutions operating in Uganda. The National Council for Higher Education whose responsibility is to regulate higher education in the



country only began operations in January 2003 and has yet to gather the required data on tertiary education in Uganda (*The New Vision* newspaper, Sep. 29, 2003, p.30).

## **2.2. Gross Enrolment Ratio**

By 1995 Uganda's gross enrolment ratio at tertiary level was 2%, way below the 3.2% Sub-Saharan average. However between 1995 and 2003 tertiary enrolment increased by 230% (Balihuta, 2001). The annual average rate of increase in tertiary enrolments has been 46% per annum in the last decade (World Bank, 2000). This raised the gross enrolment ratio to an estimated 2.8%. The projected demand for higher education with improved access to secondary education is expected to reach 126,396; making up only 3.1% gross enrolment ratio (Ministry of Education and Sports, 2003).

## **2.3. Number of Students in Higher Education**

In the 1950s Uganda had a single university – Makerere University College – with enrolment of about 250 students at its peak. By the year 2000, Uganda had 29 tertiary institutions housing 55,000 students. By 2002, enrolment in 57 institutions ranged between 74,000 and 85,000. The current total enrolment at tertiary level is estimated at between 75,000 and 85,000 people, normally aged between 15 and 25. Of these about 39% are female and 61% are male (*The New Vision* newspaper, Sep. 29, 2003, p. 30).

Most of the growth in tertiary education in the last decade in Uganda has been in the universities sub-sector; 65% of total tertiary enrolment. The remaining 35% are shared by other tertiary institutions in the following proportions: National Teachers' Colleges 21%, Colleges of Commerce 7%, Technical Colleges 2%, Vocational Training Institutes 1%, and other tertiary institutions 4%. Between 15% and 17% of the students registered in these tertiary institutions take science-based courses; the rest are arts-based. The proposed national strategic plan for higher education envisages a plan to shift the balance 50% science-based and 50% arts-based.

## **2.4. Extent of DE Provision**

In Uganda today, DE at tertiary level is provided by both public and private institutions. Some of the programmes offered through distance education are locally sourced while others are internationally sourced.

### ***Public universities and institutes that offer DE programmes***

Of the four public universities – Makerere University, Kyambogo University, Mbarara University of Science and Technology, and Gulu University – only the first two on the list offer DE programmes. Both Makerere University and Kyambogo University are dual-mode institutions. Although the Uganda Management Institute (UMI) is not ranked as a university, it is a degree-awarding higher institution of learning that also has a DE component. Nsamizi Training Institute for Social Development (NTI) is yet another tertiary institution offering at least one programme through DE.

#### ***Makerere University***

Makerere University founded in 1922, is the oldest institution of higher learning in Uganda. The distance education programme at Makerere University was started in 1967 in the Department of Extramural Studies. The Department has since been upgraded to a Center for Continuing Education and then Institute of Adult and Continuing Education. Plans are underway to transform the Institute into an affiliate College of Lifelong Learning.

From 1967 to mid-1980s Makerere University offered correspondence courses in formal and non-formal education. The formal programmes awarded preliminary and intermediate certificates in areas such as English language, mathematics, government, and economics, and a course for government clerical workers. In 1991 Makerere University introduced DE degree programmes for the first time in Uganda. The degree programmes

offered through DE at Makerere University include Bachelor of Education, Bachelor of Commerce, and Bachelor of Science. The Department of Distance Education in the Institute of Adult and Continuing Education also services the Commonwealth Youth Secretariat Diploma in Youth Development Work, accredited by the Open University of Tanzania.

Makerere University awards the DE Diploma in Palliative Care offered by Hospice Africa. The University is the process of developing two masters programmes to be offered through DE – Masters in Public Health, and Masters in Education (ICT) (The latter is to be supported by UNESCO). Postgraduate Diplomas in Education and in Project Planning and Management are also in advanced stages of planning.

When the DE degree programmes were introduced at Makerere University in 1991, the total student enrolment was about 7,000. The number has since risen to about 30,000, about 30% of who are distance learners.

Makerere University also hosts an African Virtual University (AVU) Learning Centre.

### ***Kyambogo University***

Kyambogo University was formally established in 2002 following the merger of three tertiary institutions – Institute of Teacher Education Kyambogo (ITEK), Uganda Polytechnic Kyambogo (UPK), and Uganda National Institute of Special Education (UNISE). By the time of the merger, ITEK was offering a Diploma in Education (Primary) through DE; UNISE was offering a certificate programme in Special Needs Education; and UPK was hosting the AVU Learning Centre.

Under the auspices of the new university, efforts are underway to merge the three DE units into one. There also plans to start new DE programmes – Bachelor of Education (Primary) External, Diploma in Special Needs Education External, and Bachelor of Education (Special Needs Education) – in addition to the ongoing programmes.

Through the former ITEK, Kyambogo University supervises all National Teachers' Colleges (NTCs) and Primary Teachers' Colleges (PTCs). Through these colleges, the universities supports her distance learners all over the country.

### ***Uganda Management Institute (UMI)***

UMI is a public degree awarding institution that is not a university. It is a host to the Global Distance Learning Center (GDLC) of the World Bank. The center mainly runs short courses and seminars for top executives and professional using satellite technology and other computer-aided modalities. The UMI is planning to extend the services of the GDLC to up-country towns in the near future.

### ***Nsamizi Training Institute for Social Development (NTI)***

NTI is dual-mode public tertiary institution that offers a Diploma in Adult and Community Education through DE, in addition to many other social development certificate and diploma programmes.

### ***Private universities and institutes that offer DE programmes***

Of the twelve private universities in Uganda – Uganda Martyrs University (UMU), Uganda Christian University (UCU), Bugema University, Busoga University, Ndejje University, Nkumba University, Namasagali University, Kampala University, Kigezi International School of Medicine, Aga Khan University, and Kampala International University – only UMU and UCU are known to run DE programmes. Kampala International University too has mooted plans to start computer-based DE programmes in the near future.

### ***Uganda Martyrs University (UMU), Nkozi***

Established in 1993 by the Roman Catholic Church, the university has a DE unit that runs certificate and diploma programmes in school management and church administration. The programmes mainly target personnel working in church-founded schools and local church parishes. UMU works very closely with the diocesan education secretary to offer both administrative and student support for the programmes.

UMU is also a host to an AVU Learning Centre.

### ***Uganda Christian University (UCU), Mukono***

Founded by the Anglican Church of Uganda in 1999, UCU has a DE unit that takes charge of its Theological Education by Extension (TEE) programmes. The TEE programmes, UCU offers certificate and diploma courses for lay Christian leaders. Plans are underway to offer a regionally collaborative Bachelor of Theology degree through DE.

### ***International Institute of Education, Kampala***

International Institute of Education is a private institution that offers administrative and student support to distance learners from various foreign universities, including UNISA. International Institute of Education does not develop and run programmes of its own.

### ***African Virtual University***

African Virtual University started as a World Bank project banking on an interactive instructional telecommunications network established to extend much needed science-based tertiary education to the countries of Sub-Saharan Africa. AVU uses interactive satellite- and computer-based technologies to share academic faculty, library resources, and laboratory experiences. In its pilot phase, the AVU concept was implemented and tested in 14 Anglophone and eight Francophone universities. Internationally AVU offers degree programmes and seminars that are open to the general public for a fee.

In Uganda, AVU started in 1997 with sites at Makerere University, Uganda Polytechnic Kyambogo (UPK), and Uganda Martyrs University (UMU) at Nkozi.

In the operational phase, AVU was transformed from a project of the World Bank to an independent Inter-governmental organization. Its head office was also moved from Washington in the USA to Nairobi in Kenya. It now has over 34 Learning Centres in 17 African countries. Although three of AVU Learning Centres are in Uganda, not one of the three centers has been able to mount the degree programmes offered through AVU. All three Learning Centres mainly mount short courses and seminars for professionals. The main bottleneck for AVU in Uganda has been failure to come up with policies on incorporating AVU activities into the activities of host institutions where AVU Learning Centres are based.

### ***Open University of Uganda***

The Government White Paper on Education (1992) proposed the setting-up of the Open University of Uganda by the year 2000. However the government only remembered to set up a task force in November 1999. The brief of the task force was to investigate all aspects pertaining to an open university and to set out the modality for establishing an open university. The task force completed its work in 2000 and submitted its report to government. No known action has taken place toward the formation of the Open University of Uganda since then.

## **2.5. Delivery Models for DE in Uganda**

Nearly all DE programmes in Uganda use print as the main delivery medium. Print is usually supplemented with face-to-face tutorials, audiotapes and telephone contacts between tutors and learners, and among learners. The use of digital information and communications technologies (ICTs) for distance education in Uganda is a relatively new development. The only exceptions to the norm are AVU Learning Centres and GDLC, both founded by the World Bank. The AVU and GDLC programmes mainly rely on satellite-based and computer mediated interaction. Print and other media are used as supplementary media.

Because nearly all the DE programmes in Uganda are within dual mode institutions, the main focus when introducing ICTs in these institutions has not been directed at ICTs for enhancing DE delivery; rather the emphasis has been on ICTs for enhancing face-to-face delivery. For instance, Makerere University and Kyambogo University have made evident strides in introducing ICTs in the management and teaching/learning processes but no infrastructure developed or policy formulated puts a primary emphasis on DE. The proposed single-mode Open University of Uganda is the only institution of higher learning in Uganda whose policy documents and proposed structures put primary emphasis on ICTs for DE. The Open University of Uganda

proposes to use radio, video-conferencing, satellite-based and computer-mediated instructional technologies as the main media of instruction.

### **3. Barriers to Technology-Enhanced DE in Uganda**

The swiftness of ICT developments, their increasing spread and availability, the nature of their content and their declining prices, are having major implications for learning. There is need to tap the potential of ICT to enhance data collection and analysis, and to strengthen management systems in educational institutions; to improve access to education by remote and disadvantaged communities; to support initial and continuing professional development of teachers; and to provide opportunities to communicate across classrooms and cultures.

In spite of the tremendous growth in the range of new ICT applications in some sectors of the Ugandan economy, the impact of these technologies in DE has not been significant. A number of factors has contributed to the low absorption rate of these new technologies into DE, and some of these are discussed in the paragraphs that follow.

#### **3.1. Communications Infrastructure**

Uganda is one of the nations falling on the other side of the digital divide (i.e. the have-nots), with telecommunications infrastructure among the least developed. No countrywide telecommunications network has been established in Uganda, and given the current low level of infrastructure development for ICTs, it is obvious that the majority of Ugandans will not be able to have access to DE through these technologies. Wherever there is some form of rural connectivity, mainly through dial-up telephone lines, the use is affected by traffic congestion due to severe capacity constraints, institutional inefficiency, inadequate maintenance, low levels of skill, diversity of equipment, and lack of common operating standards and procedure.

In Uganda, up to 80% of the digital telephone lines and modern switching equipment is located in the capital city, Kampala, with other areas having largely old and unsuitable lines. Resulting problems include high usage costs due to the low rates at which data can be transmitted or received, high percentage of failure due to poor quality of the lines, and limitations on the applications that can be used (in some areas, for instance, it is not possible to access the web). Because most of the new technologies depend on an effective telecommunications infrastructure, access to DE by many Ugandans, especially those in the rural areas, has been hampered.

Currently the main telecommunications infrastructure providers in the country include the following:

- i) Uganda Telecom Ltd.;
- ii) MTN Uganda Ltd.;
- iii) Celtel Uganda Ltd., a mobile cellular operator;
- iv) Internet access service providers;
- v) VSAT international data gateways.

Table 1 overleaf looks at the growth of different forms of ICTs in the country for a period of five years. Although no statistics could be obtained for 2003, it is expected that there continues to be sustained growth in the use of these technologies.

**Table1. Growth of ICT infrastructure in Uganda since 1996**

Services Provided	1996	1998	1999	July 2000	February 2001	July 2001
Fixed lines connected	46,000	56,000	58,000	58,000	61,000	56,149
Mobile subscriber	3,500	40,000	70,000	140,000	210,000	276,034
National telephone operators	1	2	2	2	2	2
Mobile cellular operators	1	2	2	2	3	3
Internet access service providers	2	7	9	9	8	9
Internet/e-mail subscribers (wireless access)				500	1,200	6,500
Internet/e-mail subscribers (dial-up)				4,000	4,500	6,500
VSAT international gateways				4	8	8
Public Internet service providers (cafes)		3	8	14	24	49
Public payphone licenses		7	13	19	18	49
Paging service providers	2	3	3	3		3
FM radio stations	14	28	37	40	100	110
Television stations	4	8	11	11	19	20
Private radio communication operators	453	530	688	688	770	1,210
National postal operators	1	1	1	1	1	1
Courier service providers		7	8	10	10	10

Source: Uganda Communications Commission, 2002

Whereas the trend depicted above shows some growth in communication and ICT infrastructure over the said period, the level of infrastructure and services are way below the average compared with other economies in the world (West). Moreover, most of the developments are still concentrated in urban areas, benefiting only a small percentage of Ugandans. Over 70% of the communication (ICT) services are concentrated in major urban areas, leaving the rural areas with the least access to these vital communication services, in spite of the fact that over 80% of Ugandans live here. It is clear that more still needs to be done to further develop the infrastructure, and improve their possible use for DE.

### 3.2. Electricity

Most of the ICT equipment depend on electric power to run. In Uganda, electricity is available only in towns and in very few rural areas where over 80% of the population lives. And even in places where electricity is available, there are frequent outages due, not only to rationing, but also to poor equipment. Non-reliability of electricity supply negatively affects the use of the new ICTs in DE.

### 3.3. Equipment Access

Universal access to more traditional forms of DE equipment – including radios, televisions, and videocassette players – is still a major problem in Uganda, especially in rural areas. Whatever limited access there may be to computers and the Internet is usually concentrated in the major urban centres, and most often found at the workplace rather than in people’s homes.

The lack of technology (or of an adequate technical infrastructure) is a significant barrier to the use of ICTs for DE, not only for the newer computer-based ICTs, but also even for the more traditional ICTs such as audio and video, and radio and television broadcasting.

### **3.4. Technical Support**

Access to computer equipment is short-lived without access to technical support. In Uganda, like in most African countries, all ICT facilities are imported, and this makes servicing them and providing training on them difficult. Because of the high cost of service and spare parts for computers and other ICT equipment, the fear of breaking them sometimes makes use prohibitive. This hinders effective use of these facilities in DE.

### **3.5. Cost**

Either acquiring or accessing the necessary equipment required to use ICTs for DE may have significant cost components, not only in terms of the capital cost of purchasing the equipment, but also those pertaining to maintenance and obsolescence. With the use of newer ICTs, access to the Internet through an ISP, for instance, will be another learner expense, and Internet connection can be expensive. Uganda Internet service subscribers can expect to pay an average of about US\$65 per month in service fees, in addition to a telephone usage charge for the time they are online. Telephone prices are especially very high in the country for any meaningful DE initiative to be utilized effectively. In addition, learners may also have to bear the cost of any training necessary to acquire the skills to effectively use the ICTs for DE.

### **3.6. Economic Constraints Relating to Marginalization**

Access to ICT facilities is expensive, especially in the rural areas where Internet access means a truck call to the cities where the ISPs have a presence. What is more, for communities that are a large distance from an urban centre, it can be very expensive to provide Internet access and/or technical support. Given these considerations, rural communities may not afford similar levels of ICT facilities (and hence benefit from DE opportunities) as their urban counterparts. It is important to note that as more and more resources become available via the Internet, the discrepancies, if not countered, may have serious implications for the divisions amongst the communities in terms of their access to the presumed benefits of the information society and with respect to continuing education.

### **3.7. Skills**

The use of any technology, especially ICTs, for DE may require the learner to acquire the requisite skills. Training in the use of digital ICT facilities is still low, for the majority of the population expected to enter DE.

Along with computer literacy, many DE applications using digital ICTs require skills in the English language. The use of digital ICTs is usually restricted to English speakers because of the dominance of the English language on the network. For most rural communities in Uganda, who may only know how to read and write in their local language, this feature can form a major barrier. This is part of the reason most DE initiatives still target mature learners. Teachers may also need training in adapting DE learning materials to the new electronic media, and in their new roles of teacher, facilitator, and mentor.

### **3.8. Lack of Policy on DE**

In recognition of the catalytic role that information plays in national development, the government of Uganda has set up a policy framework on ICTs to ensure optimum utilization of this resource toward social-economic development of the country. There is also a document describing the status of higher education in the country. However, there is still no policy governing distance education, nor the use of ICTs in the same.

The ICT policy document puts emphasis on two earlier Acts, which are quite relevant to the current project. One is the Telecommunications Act (1997), whose main objective was “to increase the penetration and level of telecommunication services in the country through private sector investment rather than government



intervention.” The other is the Rural Communications Development Policy (2001), which was aimed at providing access to basic communication services within reasonable distance to all people in Uganda.

In spite of the recognition of the need to use ICTs in all areas of national development, the lack of a policy document guiding the development and sustainable application of this resource in DE has affected the rate at which it is embraced in this sector.

### **3.9. Socio–Cultural Barriers**

Even if equipment may be available, there are other reasons relating mainly to socio-cultural beliefs that may hinder sections of the population from accessing them. In Uganda, for instance, ICTs are classified amongst the technical fields that are best left to men. Women have not embraced the use of these facilities with as much enthusiasm as their male counterparts.

### **3.10. Relevance of Content**

Learners encounter barriers to the use of ICTs when the learning content is not directly relevant to their livelihood, and when it does not value their knowledge, wisdom and experience. As has been noted elsewhere, most of the content available in the web is in English, which, to an extent, poses a language problem. Designers of DE programmes must have extra skills to ensure that relevant content is developed for various courses.

## **4. Proposals for Technology–Enhanced DE in Uganda**

In spite of the constraints and challenges confronting the advancement of technology-enhanced distance education in Uganda, there is a growing interest in the concept. Distance education continues to be appreciated as an important innovation within higher education. As a means for delivering university instruction, for instance, it is gradually gaining acceptance in the conventional universities in Uganda. The future of technology-enhanced DE in Uganda, however, will depend very squarely on how we go about addressing the above constraints. Some possible ways and means of overcoming the barriers are discussed in the paragraphs that follow.

### **4.1. Provision of Appropriate Technology**

DE must be learner-centered, and the medium should be selected based on an assessment of the learner needs, taking into account the desired knowledge and skills, as well as the broader technical environment. Establishment of telecentres in various parts of the country may provide isolated DE learners with access to ICTs, thereby enabling them to have access to relevant information available in the various networks and databases. At the beginning, the telecentres could be located at the existing local institutions such as the Ministry of Education offices, National and Community Libraries, or local schools, given that these institutions could already be having some infrastructure, including buildings, power and telephone connection. From these centres, DE learners could get an opportunity for low-end computer services, including storing and forwarding e-mail, other e-mail-based services such as mailing lists, and e-mail-enabled access to web sites.

### **4.2. Reduction of Costs**

Reducing cost of technology, including equipment, Internet access, etc, would greatly enhance access to DE using ICT facilities. The government of Uganda has been experimenting with the provision of tax exemptions on ICT equipment such as computers. This should ideally be extended to other technologies for DE initiatives. Access to the equipment at various DE access points such as telecentres should also be subsidized by the government and other development partners.

### **4.3. Addressing Skill Needs**

Individuals with low or no ICT skills will be unable to use the technology even if it was available to them. Users will need basic computing and ICT skills before they can make use of access initiatives. Appropriate training should be provided for those accessing DE using new technologies. An expansion of the national curriculum to include ICT topics at the primary, secondary and higher education levels will produce school leavers that not only have a high level of basic educational competence, but also good ICT skills to enable them venture into other educational pursuits, including DE.

### **4.4. Addressing Socio–Cultural Barriers**

Socio-cultural issues that bar some sections of the community from taking advantage of ICT facilities to access DE must be addressed, sometimes through affirmative action. There should be campaigns to inform, especially women, about ICTs and DE. These sensitization campaigns should be used to demystify technology, and help women and other groups understand what technology could do for them, by relating it to their lives. Other strategies would be to conduct ICT awareness seminars and hands-on workshops for the affected sections of the population.

### **4.5. Policy Development**

There is need for a good educational policy and theory in Uganda aimed at informing the selection of appropriate technologies and the development of relevant material, taking into account user experience. At a high level, there could be need for a national distance education agency to formulate national distance education policy, and to coordinate this effort at a broader level. This need is made more urgent by the fact that new technologies continue to be placed in institutions on a large scale with little or no policy informing how they will be deployed.

### **4.6. Research**

The whole area of DE, and especially with respect to the use of new technologies, has not been exhaustively researched on and understood in Uganda. There is need to commission ongoing research in this area, including national surveys on the needs of learners, current ICT provision and the appropriateness of different ICTs for DE.

### **4.7. Networking**

In Uganda, DE is still provided by residential institutions as part of their strategy to widen access to higher education. There is need for all the institutions presently involved in DE in the country to network and share the scarce ICT and intellectual resources available. This will ensure quality and cost-effective provision of education.

### **4.8. Partnerships**

Higher education institutions in the country will have to form partnerships with businesses and industries as well as the government to promote distance education. All of these organizations will be very crucial in advancing the development of distance education. The private sector will assist with technologies for the delivery of distance education. Government agencies will formulate national policies to promote distance education and invent campaigns to heighten awareness about the potential of distance education. Academicians in the meantime will create locally-based content.

## 5. Conclusion

Higher education in Uganda must now play a new role in order to prevent the already widening gap between the highly educated elite and the masses, and to ensure extensive participation in the education of the general population. Distance education is now seen as an effective, appropriate, and acceptable method of extending educational opportunities, thereby supporting the prospects for enhanced economic growth. New information and communication technologies, in particular, have opened up a range of new opportunities for course- and resource-based learning, and they are increasingly being embraced in DE to distribute teaching materials and to stimulate learning by means of one-way or two-way communication.

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**PROPOSAL FOR A NATIONAL DE STRATEGY  
THAT INCORPORATES INNOVATION IN ICTs  
TO OVERCOME THE EXISTING BARRIERS  
OF THE DIGITAL DIVIDE: THE CASE FOR NAMIBIA**

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*“...distance and open learning can in the very near future offer the majority of Namibian adults the most economic and, effective and available opportunities to seek tertiary level qualifications. Limited financial resources, family and professional responsibilities, and geography make other alternatives unaffordable or inaccessible.” (Ministry of Higher Education, Vocational Training, Science and Technology, 1994, p. 105)*

## Introduction

Information and communication technologies (ICTs) integration in distance education (DE) presents us with great challenges and infinite opportunities to make teaching and learning more exciting, interactive, and meaningful for our students. As the increasing spread of ICTs opens up opportunities for developing countries in all sectors of the economy, Namibia in particular, has to harness these technologies and services to advance the delivery of education while also serving other development goals (Mansel & Wehn, 1998). However, the growing digital divide is worrisome as it is leading to greater inequalities in development between developed and developing nations and significantly between the distant rural areas and urban areas within most developing countries.

Clearly, access to conventional on-campus face-to-face education especially in developing countries (though not exclusive to developing countries alone) is problematic to some people due to a variety of reasons associated with limited financial resources, family and professional responsibilities and geography as underscored by the opening citation. Hence, distance education in Namibia serves as an important alternative means of expanding access to education, thereby contributing to the development of Namibia’s human resource base.

The purpose of this paper is to give an overview of higher distance education (HDE) in Namibia and to highlight some achievements and constraints in this sector and then suggest a plan of action or proposal for future ICT-enhanced DE.

Initially, the description of the historical and contextual background of the country as linked to its geo-political and socio-economic contexts is given. An overview of the current situation of distance education in Namibia is given, incorporating institutions offering DE, enrolment rates, and current delivery modes of open and distance learning (ODL) in pre-tertiary (i.e. secondary) and higher distance education, respectively. Constraints in usage and development of ICT enhanced distance education are described. Ultimately a framework for addressing the future of technology-enhanced distance education in Namibia is proposed.

Using a document analysis method, this paper draws from a variety of studies, reports and documents on pre-tertiary and higher distance education in Namibia.

To sum up, this paper addresses among others, the following aspects regarding DE in Namibia:

1. The current situation of HE in Namibia: a summary of HE in Namibia, gross enrolment ratio in DE institutions, number of universities, number of students participating in DE, the extent of DE provision; dominant delivery models used for DE.
2. Barriers or constraints pertaining to technology-enhanced education in Namibia, the levels of access to different forms of technology, national policy barriers, social and cultural barriers.
3. Proposals for the future of technology-enhanced DE in Namibia, including how the strategy will overcome the barriers listed above, in a sustainable way.

## Context

As in many countries of Sub-Saharan Africa, the provision of higher education and distance education, respectively, in Namibia has been shaped by a diversity of factors deeply entrenched in the country’s “geo-political and socio-economic context” (Möwes & Siaciwena, 2000, p. 5). Hence, it is vital and essential to examine the developments in (higher) education generally and distance education in particular within this broader context.

To explore the appropriate roles for higher (distance) education, it is vital to register that Namibia is a large country with a very unevenly distributed population per square kilometers. With an area of 824,269 square kilometers, and a low but widely scattered population of over 1.8 million resulting in a low population density,

which adversely affects education provision in important ways (Kazapua & Odada, 2001). As reported in several studies (Dodds, 1996; Möwes & Siaciwena, 2000; Kazapua & Odada, 2001), nearly half (i.e. 45%) of Namibia's population live in the north-central, 15-20% live in Windhoek – the capital city and areas close to it. The rest of the population is scattered over the rest of the country. Coupled with challenges related to infrastructure, the dispersed settlement patterns in distant rural areas raise the cost of providing quality education with the two ministries of education spending between 25-30% of the national budget on education. In spite of the inequities associated with educational provision that were inherited from the then apartheid system of government of the Republic of South Africa, Namibia has attained nearly 80% basic literacy 12 years after independence.

Due to the legacy of apartheid, one of its serious effects was that the majority of half the population, which lives in the north, was deprived of the necessary educational resources, facilities and opportunities resulting in an equally uneven distribution of tertiary qualifications across the regions (Dodds, 1996, MHEVTST, 1999). Therefore, the demand for education in that region, both for children and adults who had very limited opportunity to attend and complete schooling, is enormous. Accordingly, the education deprivation was, however, not exclusively confined to the northern region and the need is proportionately, if not numerically, as great in all other rural areas (ibid.). These two factors size and unequal access to the education system — make it difficult for higher education to cater for the needs of the citizenry thereby qualifying distance education and open learning to reach out to all corners of the country and redress the inherited inequities. Extant literature acknowledges the uniqueness of DE as it breaks the barriers associated with time and space to allow every adult to claim their right to education.

## **Present Situation**

In comparison with other Sub-Saharan countries, the Namibia education is relatively small due to the smaller population. In 1999, student enrolment in tertiary institutions amounted to 10,000. Tertiary institutions include vocational training centres, colleges of education, colleges of agriculture, the Polytechnic of Namibia (PoN) and the University of Namibia (UNAM). While statistics could not be obtained in certain cases, enrolment in colleges of education during 2002 was 1,992.

The then Ministry of Higher Education, Vocational Training, Science and Technology (MEVTST), now called Ministry of Higher Education and Employment Creation was formed in 1995 to guide the development of higher education, stimulate vocational training as a vehicle for socio-economic development and enhance science and technology for community empowerment, wealth creation and poverty reduction (MEVTST, 1999). The higher education sector actively contributes toward human resources development for Namibia and more generally to national development given the critical role played by these institutions in developing necessary skills and expertise that are critical to foster sustainable development.

## **Current Provision of Open and Distance Education**

The provision of open and distance education in Namibia (ODE) in Namibia is rendered at a variety of levels ranging from adult literacy programmes, through pre-tertiary education to tertiary education. The major publicly funded providers of this form of education include Namibia College of Open Learning (NAMCOL), National Institute for Educational Development, Polytechnic of Namibia (PoN) and University of Namibia's Centre for External Studies (CES).

NAMCOL serves as the major player in ODE and was established by an act of parliament in 1997 to cater for pre-tertiary, i.e. secondary education to mostly out-of-school youth and young adults. The Polytechnic and UNAM are engaged in providing programmes on the open and distance mode in various fields of study while NIED uses a single mode (Knowledge, Information and Technology, 2002). Additionally, Windhoek and Ongwediva Colleges of Education also play a supporting role in the delivering of the BETD In-service programme (the Basic Education Teachers Diploma) through DE. The Namibian Broadcasting Corporation (NBC) plays a crucial role in the provision of educational services through radio and television (Du Vivier, 1999).



Given the fact distance education allows students more choice and flexibility, a number of Namibian students also enroll at other HE institutions in the neighboring country, South Africa through private DE providers but also partly due to the fact that local programmes still need expansion. Thus, the role of these private providers deserves recognition. They are largely South African (public/private) institutions, including University of South Africa (UNISA), which is represented by a private company in Namibia called “Open Learning Group” (Kazapua & Odada, 2001), Vista University, Technikon RSA and Technisa (Vivier, 2000). Others comprise Rand Afrikaans University (RAU), and Damelin Education Group. Institute of Higher Education (IHE) – a Namibian born organization offers professionally tailored courses leading to qualifications awarded by European institutions and/or universities such as Association of Business Executives (ABE) (UK), University of London (UK) and Cyprus Institute of Marketing (CIM) (Cyprus), etc. (Kazapua & Odada, 2001).

The dominant modes of delivery for open and distance education in Namibia is the dual mode model. These institutions are described as dual mode generally because they teach both fulltime students on campus and part-time students at a distance (UNESCO, 2000). They include University of Namibia, Polytechnic and NAMCOL, which recently ended its dual mode for a single mode combining limited face-to-face with the use of materials in an open learning approach (Vivier, 2000).

National Institute for Educational Development (NIED) delivers in-service teacher education for unqualified and underqualified teachers through a single mode/distance combining print media and a limited face-to-face contact session at scheduled times.

## Current Efforts on ICT Integration in DE

The single most common method of delivering open and distance learning in pre-independence Namibia was the use of traditional printed-based material (text) and assessment through assignments and examinations with no or limited student support services. Lately in post-independent Namibia, considerable progress has been made in the area of ICT application in DE. The public providers of open and distance learning institutions are actively engaged in exploring the use of ICTs in a variety of areas including tuition/programmes delivery and provision of student support services to raise motivation and success. There are several initiatives that are currently underway in Namibia, which we believe are worth mentioning here.

First, University of Namibia (UNAM) and Polytechnic of Namibia (PoN) are introduced tele- and video-conferencing as part of their instructional/delivery modes used in DE.

Another case in point is National Institute for Educational Development (NIED), which has in the past years, provided useful information about its distance learning activities online for the benefit of both prospective students and current students and continues to add more variety. However, study materials in the form of modules and independent activity booklets are not online, though future plans exist to incorporate all course materials on the Internet. The online material plus additional resources with local content about programme activities, subjects’ overviews, support services, and modes of assessment etc., are currently also being availed on CD-ROMs to be distributed to different TRCs, Inset Units and study centres for use by students and interested members of the public.

Further, given the possibilities that ICTs may bring in education, during 2002, NIED opened up international cooperation with high-level educational institutions to prepare Namibian educators for the infusion of technology into teaching. WIDE World Programme *Online Teacher Education Institute* – a component of Harvard University Graduate School of Education based in the United States – is one such example of the several projects currently underway. This accord between Harvard and NIED includes Namibian Colleges of Education teacher educators and NIED education officers as beneficiaries of the course. The pilot phase took on board 40 teacher educators (approximately ten from each college) to participate in the WIDE World course entitled *Teaching to Standards with New Technology (TSNT)*. The success rate was nearly 100 percent. NIED has secured more funding from its partners to allow even more educators participation in this professional development activity with additional four education officials who successfully completed the same course last summer bringing the total of graduates to 46. Another ten are currently taking the TSNT course this fall semester.

The TSNT course sought to equip these practitioners with the necessary skills and understanding for integrating technology in the classroom. It is expected and hoped that these educators will model technology use in their classrooms in ways that promote constructivist and learner-centered paradigms, which form the

principles around which this course is build. As part of the localization activities of the course, Harvard will train coaches or moderators and master coaches from the pool of graduates those who will be willing to serve as coaches in the localized online course which NIED shall develop. Ultimately, the goal is to have better prepared teachers who, upon graduation, will be able to infuse ICTs in teaching to leverage student learning.

Thirdly, NAMCOL is also developing coursework material for web-based education for English Junior Secondary. The dedicated staff of NAMCOL is using course teams through particular a Learning Management system. Clearly, it is recognized that the WWW has opened a new arena for distance learning courses and access to remote resources.

The description of the four publicly funded ODL institutions will follow, including the courses offered, the type of technologies used to deliver ODL, mode of delivery, and enrolment rates.

## **Centre for External Studies at University of Namibia (UNAM)**

University of Namibia was established by an act of parliament in 1992, followed by a proposal to establish a Centre for Adult and Continuing Education and Distance Teaching. At present UNAM is the only national university. In 1993, Centre for External Studies (CES) was established out of a combination of Department of Distance Teaching and Centre for Adult Education. CES grew out of Department of Distance Teaching of Pre-independence Academy (combining a University, Technikon and a College of-Out-of School Training). It administered, with little quality control, a traditional single mode and correspondence education programme with cheaply didactic print courses and virtually no student support system.

As the centre for distance and open learning of University of Namibia, during the first five-year plan, CES committed itself to continue and expand its distance education services, to include the formerly disadvantaged communities, who were already employed. So, it became one of the CES's<sup>1</sup> key goals and responsibility to reach out to those people in the former "homelands" to assist them in the furtherance of their education (Möwes & Siaciwena, 1999).

The number of students *enrolled* in the DE mode for 2002 was 3 658, inclusive of the regional centres. It has escalated to 4,310 in 2003. This is the latest figure, including new intake in August 2003.

CES mainly taught through *conventional face-to-face* on-campus approach. Although this mode of delivery remains at the center of tuition, efforts have been made to incorporate other delivery models complemented by print. Currently, printed materials and face-to-face sessions are the main mode of instructional delivery. Further, some of these materials are being made to include audio materials as well. Vacation schools in the form of face-to-face tutorials or by means of interactive video conferencing are organized at various centres from time to time (Möwes & Siaciwena, 2000). Today, print still remains the dominant mode of delivery. In some of the language courses, audio is included to complement print. Added to the list is video- and tele-conferencing by satellite. This mode of delivery is very expensive, but has proven to be effective (Lewin, Oct. 2003).

Considering the difficult conditions, which the majority of students face in DE, decentralised student support system is widespread through the establishment of regional centres, tutoring through assignments (marker tutoring), telephone tutoring and face-to-face tutorials.

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<sup>1</sup> The mission of the CES is thus to make quality higher education accessible to adult members of the community by the provision of open learning through distance and continuing educational programmes. Initially, most of the programmes were geared to suit the needs of teachers, which gradually phased out, because they became inappropriate for an independent Namibia. Today the CES offers various diploma and degree programmes covering nursing, African languages, education, library science and business administration.

## Center for Open and Lifelong Learning at Polytechnic of Namibia (PoN)

In 1994, PoN was established with the promulgation of an act. One of its key aims is the provision of continuing education at post-secondary level, including the establishment of a separate Distance Education Centre (DEC). In January 2000 the name DEC was changed, because it was seen as too narrow in its scope. The new name, COLL, was adopted – Center for Open and Lifelong Learning (Keyter, 2001). The main function of COLL is to design, develop and deliver courses, using open and distance learning principles. This year, as reflected in the annual report, 848 students were registered for part time studies only, while 1,667 full-time and part-time students enrolled for two courses on average through open and distance learning. Reportedly, approximately 26,904 assignments have been administered (COLL Annual Report, 2003).

The main *mode of delivery* constitutes *printed course materials* of a high quality. As stated in the Annual Report for 2003, while print remains the main delivery mode for most courses, it is envisaged that emphasis will shift to the use of *interactive web-based learning*. Improvement in student support services is evident. Assignments coming from students are used as a teaching tool and tutor markers, therefore do not just mark in a conventional sense, but also give the necessary advice and encouragement on how students can improve on their work. *Telephone tutoring* at specified times is also used to strengthen student support. Face-to-face tutorials and vacation schools are offered to enable students to meet tutors, and make use of library facilities as well.

PoN uses the same regional offices as UNAM, to be cost-effective, and for students to get the administrative and academic support needed. Nine such offices exist in UNAM's regional centers. The Center for Open and Lifelong Learning at the Polytechnic of Namibia also places emphasis on student decentralised support services. Worth mentioning here are training seminars for tutors to strengthen their individual capabilities in tutoring distance education students, the moderation of tutor-marked assignments guided by criteria based on open and distance learning principles, and the orientation seminar for new students during the initial vacation school to help them to identify and exploit sources of support services that are available to them as remote or isolated students (COLL Annual Report, 2003).

## Namibian College of Open Learning (NAMCOL)

NAMCOL was established by an act of Parliament in 1997 and serves as the major player in open and distance learning (OPL), which caters for pre-tertiary, i.e. secondary education (grades 10-12) to mostly out-of-school youth and young adults. Besides, secondary education, NAMCOL offers opportunities to its clientele to acquire additional qualifications. For instance, in 1997, NAMCOL introduced a certificate in Education and Development in conjunction with one of its partners, UNISA ABETA Institute intended to meet staff development needs of district literacy organizers, agricultural and health extension, etc.

NAMCOL has helped more than 160,000 students achieve educational objectives that would otherwise be beyond their reach since its inception in 1997. In doing so, NAMCOL has become the single largest educational institution in Namibia with more than 26,000 learners currently enrolled, which amounts to more than the combined number of students at all the other higher educational institutions. In its Annual Report (2001), NAMCOL reports improving pass rates. The pass rate in the Junior Secondary Certificate has increased from 67.1 percent in 1999 to 79.7 percent in 2000. The pass rate for 2001 was nearly the same (79.4 percent), but better overall grades were achieved. At IGCSE level, the pass rate has improved from 69.6 percent in 1999 to 72.6 percent in 2000 and for 2001 stands at 74 percent (*ibid.*). NAMCOL's stakeholders range from learners who need to bridge the gap between formal secondary education system and tertiary institutions, to adults seeking to expand their horizons from basic literacy to advanced courses in specialized fields (Annual report, 2002).

NAMCOL has, until recently (2003) employed a dual mode of delivery combining face-to-face evening classes and distance education with face-to-face outstripping that in the distance education mode (NAMCOL, 2001, p. 1). Currently a new mode of delivery, which combines face-to-face classes with the use of materials in an open learning approach, is in use. The open learning approach is perceived as an improved system for independent learning. All students that are enrolled under the OPEN mode, are getting the fol-

lowing: limited face-to-face sessions, with ODL programmes, providing quality developed and printed materials, vacation workshops, and one mock examination.

Printed materials are complimented with additional audio cassettes in the case of languages. NAMCOL further makes use of the Namibian Broadcasting Cooperation to broadcast educational programmes for learners as well.

## **National Institute for Educational Development (NIED)**

NIED was established in 1991 to spearhead the reform of the formal educational system through curriculum and materials research and development, pre-service and in-service of teachers and to conduct educational research. The Institution is a line directorate of Ministry of Basic Education, Culture and Sport.

With the introduction of Basic Education Teacher's Diploma (BETD), as the standard qualification for teachers in Namibia, the four existing Colleges were assigned responsibility for offering this programme for pre-service candidates. The BETD pre-service is a three-year diploma programme while BETD in-service is offered over four years. National Institute for Educational Development (NIED) delivers the BETD in-service teacher diploma for the unqualified and underqualified teachers through a single mode distance education combining print media (module guides: activity booklets and support materials) and a limited five days face-to-face contact session that occurs three times per academic year in the first week of each school holiday. Since its inception, the NIED has graduated a total of 1,551 teachers with another 390 expected in 2003. Currently, 2,181 inset teachers are enrolled in the programme.

Tuition takes place at six In-service units and Teachers' Resource Centers (TRCs) located countrywide. Student support services are highly decentralised. Besides the face-to-face sessions, they include tutoring through assignments, student self study groups (SSG), TRCs and/or In-service Units. NIED also recognizes the importance of technology integration into education to advance teaching, learning and research. The establishment of fully networked PC Labs with servers within each TRCs unit that are located in the regional offices of education as well as within NIED, is a deliberate effort by the institution to extend student support services. These computer centres, which were established in May 2000 with the support of the United States Agency for International Development (USAID), and Academy for Educational Development (AED) serve multiple purposes including the provision of venues for teachers to gain access to computer/ICT-based training, and providing access to the Internet and computer-based resources for teachers-based in-service training, lesson preparation and Internet research as well as providing locations for community, NGOs and private sector groups to use the computers resources for informal and training purposes (Boer & Goveia, 2002).

To fulfill these purposes, each centre is equipped with a small local area network (LAN) with at least over seven multimedia workstations (for the smaller-medium centres, while the medium-large centres received 13), a laser printer, Zip drive, CD writer, a tele-conferencing camera, and a server, and connectivity deployed by SchoolNet/Namibia. The server run a Linux operating system and the LANS are connected to shared 64k Internet leased lines. Each center has an Education Technology Trainees<sup>2</sup>/person who (ITT) manages the PC Lab and render on-site support to the users.

The TRCs and/or Inset Units serve multiple roles including administrative functions, studies centers, and render Internet access to students. These facilities raise student motivation and reduce student attrition. NIED uses a team approach to produce study materials, print the material, and does distribution to the TRC/Inset Units.

## **Coordination of ODL Activities**

Considering the demands of a knowledge-based society, the Namibian DE and the ministries of education recognize the importance of networking with each other and also with similar institutions internationally. It

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<sup>2</sup> This term is being used to describe that the ITTs are yet to attain higher levels of academic qualifications to qualify as ICT Technologists, but possess basic computer skills and are currently receiving on-the-job training though they lack experience working in the education sector. ITTs are largely out-of-work female youths.

is acknowledged that the benefits of networking are many, among others are fostering the sharing of ideas and lessons on best practices, improved service delivery and efficiency in the use of resources.

Based on mutual understanding, public providers of open and distance learning (NAMCOL, UNAM, NIED and PoN) have formed a collaborative structure with the Ministries of Basic Education, Sport and Culture and Higher Education, Training and Employment Creation to jointly provide better learning resources at centres throughout the country. In fact membership to NOLNeT also covers foreign providers of DE who meet the defined criteria for membership agreed upon by the ministries of education and NOLNet partners. For instance, UNISA already holds membership so that its students based in Namibia can also benefit from the services offered. The initiative is supported by the European Union and managed by a trust, called Namibia Open Learning Network (NOLNet). Essentially, NOLNet was formed in July 2001 to construct conditions and structures for the partner institutions to:

- communicate with one another about their activities and plans in relation to ODL;
  - coordinate the development of new courses and facilities to avoid duplication;
  - cooperate in planning and carrying out joint activities...
- (<http://www.nied.edu.na/projects/NOLNet.htm>).

ODL students are able to access online material through several Teachers' Resource Centres, which are fully networked to the Internet across the educational regions. Moreover, the Namibian Open Learning Trust (NOLNeT) has added another 47 centres of which over 15 are fully networked in locations around the country for use by all the students enrolled with any one of the partner institutions to make a success of their studies. NOLNet and the Teachers' Resource Centres scattered throughout the country has expanded the range of student support services including access to the Internet, libraries, photo copiers, audio visual and audio equipment to promote student learning.

## **Constraints**

### **Lack of skilled and competent manpower**

All open and distance learning programmes in Namibia are dependent on local tutorial support by educators/teachers and persons employed in other fields. This type of expertise and support is inconsistently available throughout the country. Problems associated with this system is that you often at times get less value for money as the quality of tutoring and written material is sometimes below the standard accepted. Currently, some tutors tend to commit themselves in multiple ODL programmes being offered and at times do not cope with their responsibilities due to burnout and clashes in the teaching schedules.

### **Drop-outs**

The current drop-out rates of students on ODL programmes remains unacceptably high (Knowledge, Information and Technology, 2002). For instance, NAMCOL reports that 27.4% of its distance education students and 8.1% of its face-to-face students failed to enroll for the final examination (*ibid.*). Other 19.4% and 8.7% respectively failed to complete the examination after entering for it. Thus, bring the actual drop-out rates to 46.8% and 16.8% respectively (Du Vivier, 1999). Further reports (e.g. NAMCOL Statistical Digest, 2002) reveal that among NAMCOL's JSC learners of 36,699 subject enrolments recorded in 2002, no examination results were recorded for 5,047 learners. Though figures for the tertiary institutions are not readily available, a similar drop-out rate is to be expected. There is a lack of systematic inquiry or research being carried in this area by ODL institutions to guide current practice. So, it can only be assumed that there are multiple factors at play.

### **Relevance**

As noted earlier, the programmes offered on ODL are rather limited in extent and mainly focused on certain easily accessible target groups, the common one being teaching education. At present, no technologically based programmes are offered on ODL, although the Polytechnic, in particular, has plans to deliver its technologically



based programmes on distance in the near future (ibid.). There is urgency to integrate ICT-related content in some courses.

## **Fragmentation or lack of integration and flexibility**

The ODL offerings suffer from the tendency of institutional fragmentation of design, production and student support services. The current arrangement of ODL institutions where institutions develop their own programmes for smaller groups of students that are scattered around the country allows little possibility for economies of scale which mega ODL universities enjoy. Flexibility is further constrained by the assessment and accreditation systems of the national departments and institutions. With the exception of UNAM, which has several intakes per year, all other institutions have only one intake per year. None of the institutions has continuous enrolment. Flexibility implies that geographical diversity, time, curricula; working and family circumstances of the student must be taken into account.

## **Socio-economic and cultural shifts**

Since independence, Namibia is experiencing an increased demand for higher education. With independence there is a notion that tertiary education will improve the citizen's social capital and standard of living. Unfortunately, higher education in Namibia been characterized as generally supply-driven rather than demand- or need-driven, cannot absorb the numbers. Other programmes in our higher education sector also seem out of touch with the present realities. Therefore, there is urgency to synchronize tertiary programmes with the rest of education system and with the development needs of the country. While distance education is on the rise, the national policy guidelines have been slow to shape up and guide activities in this sector. There is also general dislike of distance education in some culture as this form of education tends to be regarded as second class. Need for outreach programmes to sensitize parts of the population is vital.

## **Other challenges**

Namibia shares similar constraints as with other countries in Sub-Saharan Africa regarding the infusion of education in DE. From the foregoing discussions, it is clear that amongst others, Namibia lacks sufficiently trained IT experts as in some cases it had seek support from elsewhere to develop capacity locally. Insufficient development of educators and teachers, high costs of ICT equipment, software and training as well as monopoly of telecommunications associated with excessively restrictive rules and high costs by Telecom Namibia – the only state owned company licensed to offer provide infrastructure.

## **Proposed strategic vision**

*We propose a totally integrated, unified, and flexible education and training system that will prepare Namibians (students and professionals alike) to exploit the advantage of a rapidly changing global environment and that will contribute not only to the economic, but also the political, social, and cultural upliftment of the citizenry.*

## **Features of the envisaged education and training system<sup>3</sup>**

We propose an education and training system of education, which will incorporate in its DE provision, the following features:

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<sup>3</sup> Adapted from Knowledge, Information and Technology, 2002. We are indebted to the Multidisciplinary Group 7 of the Polytechnic of Namibia. Their work reinforces our envisioned and refocused DE system for Namibia.



1. A nationally conceived curriculum, but locally adapted with an intensified focus on Science and Technology.
2. A large number of independent and semi-independent learning centers all over the country, all connected to the information super highway.
3. Learning centres managed by professional educators.
4. The development of learners to the full potential, including creativity, culture, sport and the arts, but with cognizance of the requirements of the knowledge society for technical skills.
5. To prepare students for a rapidly changing world with competencies that will encourage and facilitate their future learning.
6. A system that will incorporate the use of ICTs to complement print media but not to replace them, including voice/audio, audiotapes, telephony, video, computer technologies and web-based learning in DE at all levels (UNESCO, 2003).

## Scenarios

### Best-case scenario/Positive scenario

A positive scenario for the future deployment and use of ICTs in open and distance learning or simply distance education in Namibia with the objective to provide economic benefit for all members of the Namibian society requires at least the implementation of the following strategies:

1. Developing, implementing and monitoring a national DE-ICT-enhanced policy to guide practice. This policy shall have clearly defined National Standards for DE and ICT within this sector.
2. Establishment of a single self-standing Open University in which a separate and autonomous tertiary institution is created with exclusive responsibility for pre-tertiary and tertiary open and distance learning programmes. Though this may have substantial start up capital, in the long run, economies of scale will arise. Eventually, this may address issues pertaining to current fragmentation in manpower in DE provision and the issue smaller groups of student population that are scattered between the four institutions.
3. Investments in electrical and electronic engineering, and computer science education and technology, high financial support, virtual Internet-based training facilities used to reach all Namibians.
4. Identify the best way to revise the curriculum and delivery methods to take advantage of newest technologies.
5. Support of cooperations of the Namibian institutions with international research institutions to share expertise and learn together.
6. Support for ICT/Internet access centres in rural areas is given, installation of wireless LAN implementations in identified centres of the country.
7. Investment in governmental ICT infrastructure and IT services to spread connectivity to all the regional centres supporting DE.

### Alternative scenario

The alternative scenario is one that will result from Namibia continuing with its present fragmented distance education system where different ODL institutions are managed and controlled by separate structures and only little improvement in student success rates, student support services and delivery modes, as well as limited flexibility integration. The current coordination brought by the four public institutions offering DE through the Namibian Trust, NOLNet makes little significance as the partner institutions are still managed independently.

Under this scenario, Namibia would continue to do well in providing access to students who for some reasons cannot be accommodated in the pre-service higher education.

The advantage of this scenario is that each institution will define its programmes according to its own priorities and tailor its activities to the specific students it seeks to serve (MHEVST, 1999). At the same time, the downside is that this approach will likely produce overlapping and duplication of courses and facilities. It is also

likely to have high development costs both in absolute and per-student terms and, probably, lower quality and, perhaps, narrow course offerings.

Priority must be given to the development, implementation, and monitoring of a comprehensive DE and ICT policy for Namibia. After the successful implementation of the policy, which must have the support of all sections of the population, including the industries and the government, we can expect the following development:

- expanded access to pre-tertiary and tertiary education through DE;
- an establishment of an open university incorporating all programmes of DE resulting into flexibility and integration in course offering and enrolment;
- national quality assurance system is in place at all levels;
- positive view and embrace of distance education by all members and groups in society;
- increased success rate resulting in lower attrition and drop-out rates as research, and financial resources have been pulled and mobilized to improve DE;
- existence of a large of DE learning centers all over the county in the regions;
- increased cooperation between institutions of higher education nationally, regionally with SADC and Sub-Saharan Africa, as well as internationally.

In conclusion, DE in Namibia currently seem to be well organized in four publicly funded institutions with minimum level of coordination through NOLNet to share strategies and coordinate the delivery of distance education in the areas of student support, programme development and the incorporation of ICTs in delivering tuition. Scenarios and strategies for future improvement have been suggested with caution taking into consideration contextual factors which may limit success.

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**A CYBER POLICE FORCE FOR A CYBER ISLAND  
THROUGH OPEN DISTANCE LEARNING**

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## Economy

Mauritius whose successful development once reposed on an economic lifeline tapped primarily from its sugar, tourism, and textile industries is now mutating into the high technology world of Information and Communication Technologies (ICTs) to become a cyber island.

The new dynamics of the world's economy are the catalyst for such a metamorphosis orchestrated by our previous Prime Minister now the President of the Republic who took this up as a personal challenge during his last three years of prime ministership. He has rightly been dubbed the father of ICTs in Mauritius.

It has to be acknowledged that the sugar protocol still guarantees high prices for European exports and remains an important aspect of our economy.

The textile industry with the help of the special trade relationship with the US under the African Growth and Opportunities Act (AGOA) holds some promises, too.

However, dark clouds hang over our heads as the sugar protocol comes under pressure and the textile exports to the EU and the US are under scrutiny by the World Trade Organisation's (WTO) new rules and free trade agreements.

## ICT Landscape

Modern ICTs are a good omen for small island economy like Mauritius. Academics, policy-makers, business executives are unanimous in resonating that the economic development of a nation lies more in its ability to access the appropriate information, and transform it into new products and services.

In the new configuration, ICTs constitute one of the most important tools to open up new avenues of sustainable growth to expand our economic horizons, and build a more diversified and resilient economic base.

To be part of this knowledge-based economy, a cyber city is emerging to provide a world-class telecommunications network through both satellite and fibre-optic cable that links Portugal and Malaysia via South Africa and Mauritius.

It will also provide computing on demand, an Internet data centre to back up data and servers for web-hosting, e-commerce and financial transactions.

Other projects such as a hypermarket, conference centre, a cyber village for accommodation and additional high tech office space will follow suit.

So, much so for infrastructure, but this alone does not suffice.

## Human Capital Formation and Development

Human Capital Formation and Development is an absolute necessity if such a transformation is to crystallize to bring in the expected returns on the massive initial capital outlays.

In parallel, huge investment has gone into the teaching of ICTs in the formal sector right from the primary through to the tertiary levels, sparing no one, not even those who have never seen a computer before.

In anticipating a demand for ICT training, we at the Mauritius College of the Air (MCA) have been proactive in the sector since 1996/97 when we designed and developed the package entitled *Information Technology in Everyday Life* through Open Distance Learning (ODL). The package comprises a self-instructional course manual and a video cassette or CD-ROM.

This was intended for adult learners willing to become IT proficient. The package has since been subscribed to by over 2,500 adults from all walks of life.

In 1999, the Commonwealth of Learning awarded a Certificate of Merit to the course for excellence and innovation in distance teaching.

In 2001, the Government in its continuing efforts to transform Mauritius into a cyber island, set up an inter-ministerial committee on ICTs under the chairmanship of the Prime Minister to harness the enormous potential of ICTs to the development needs of the country.

To steer the project, three task forces were set up. The Minister of Education led the task force on e-education and training whose remit was to ensure that the necessary human and technical resources were made available to implement successfully the cyber-island project.

In its wake, the *IT in Everyday Life* course was replicated by the National Productivity Competitiveness Council for training of the general public since 2002 in ICTs.

## The Police Project

At a passing out parade for new recruits, the Prime Minister, under whose jurisdiction comes the Mauritius Police Force, unveiled the plan to computerize all police stations up and down the country to better the services offered to the public at large.

The Commissioner of Police, in turn, envisioned a laptop in every police patrol vehicle to access a database to check the particulars of suspect vehicles, among others.

The MCA picked up the cue and followed it up with the top brass of the force immediately after, with our existing *IT in Everyday Life* course, to train police officers in the use of computers.

The course draws heavily on the principles of adult learning, the focus being a learner-centred pedagogy in line with good ODL practices to promote self-directedness. The essence is to impart the necessary IT skills and sustain motivation through the self-instructional interactive course material with its built-in support. The course comprises the following units:

Unit	Topic
I.	Introduction to Information Technology
II.	Computer System and its Components
III.	Main Applications of Computers
IV.	IT Related Issues
V.	Choosing your Own Micro Computer System
VI.	Supplement – PowerPoint, Access (upon request from Police Force)

Following the interest shown by the force, a course review was done by the Police IT Unit to assess its suitability for the officers.

In the light of this review, Access and PowerPoint were recommended for addition. This was done through Unit IV in a supplement.

There was an overwhelming response from police officers to enroll when the course was advertised through the Police Press Office.

Some 1,500 filled in the enrolment form and in consultation with the police force, we decided to proceed with a cohort-wise intake.

In order to remain faithful to the objectives we set ourselves, we hatched a hybrid mode of delivery and set up a learner support system to ensure maximum completion rate.



## Delivery Protocol

The Mauritius Police Force operates a 3-shift system and in order to ensure that all those enrolled are given an opportunity to benefit maximally from our services and successfully complete the course, we split the first cohort of 300 into 15 groups of 20 each.

Each group is allocated a tutor. The cohort of 300 officers was invited to an induction when they were supplied with the course material and relevant documentation pertaining to a smooth delivery of the course. They were given all necessary instructions by the Course Coordinator on how to manage their learning, the do's and don'ts and it was also an opportunity to interact with their respective tutors and peers. The induction ended with a get-together to enable some social interaction among learners/learners and learners/tutors.

Units I and II are studied at a distance as they are theoretically oriented paving the way for the knowledge-application and skills acquisition, the contents of Units III and VI.

IT skills cannot be acquired without hands-on. At the same time, we felt they had to be given an equal share of theory because practicals are meaningless without a good theoretical grounding. We have, therefore, given a good basic theoretical component to the course so that during the hands-on, the learner is equipped with theoretical knowledge to optimize on these sessions.

The officers are given seven weeks from induction to complete Units I and II. After week three, a written Tutor Marked Assignment (TMA) is due on Unit 1 and after week seven, another similar TMA is due on Unit II. However, help is always at hand in case of difficulties as the tutor is available on the phone once a week for two hours in the evening. Each officer receives details about this synchronous phone counselling.

After week seven, the officers are invited to our computer laboratory for Units III and VI. These are covered in eight two-hour weekly sessions of hands-on with a tutor. These sessions are offered at different times during the day except Sundays so that every police officer in this cohort is given the opportunity to benefit from those supervised sessions. During these sessions, computer applications like MS Word, MS Excel, the Internet, E-mail, MS Outlook, MS PowerPoint and MS Access are covered. These sessions are also opportunities for contiguous two-way communications between tutors and learners. This hybrid strategy of delivering learning overcomes isolation, motivates the learner and enhances learning outcomes. This approach also improves the quality of the learning experience by allowing contiguous interaction with peers/tutors.

After those eight sessions, another TMA done on the computer this time is expected from each officer because by this time the learning outcomes would have been those computer applications.

Officers not having access to computers at home or the Police Stations can book the computer laboratory when it is free to practise using the computers and do their assignments. They are normally assisted by someone fully conversant with computer applications from the Division of Distance Education. So, no excuses for failing to do the assignments.

The remaining two Units, i.e. IV and V, are completed within another five weeks through distance learning with a TMA done on the computer for each Unit. On the whole, the course lasts 4-5 months through ODL.

## Meeting Support Needs

In distance learning, the support system is taken to encompass a whole array of services, including physical/infrastructural and social facilities contributing toward a closer rapport between learners and the institution (Rashid et al, 1993) Given the specificity of the target audience and bearing in mind their numerous social, domestic and professional commitments, we set in place a learner support system that complements the learning activities in the course. Also conscious of the need for distance learners to interact with someone to mitigate isolation, the purpose of the learner support is also to meet that need in a true spirit of exchange for the sake of meaningful learning outcomes.

We, therefore, recruited a retired rector with many years of proven teaching experience in both the presential and distance education settings to ensure that superior support we had intended to offer.

The Learner Support Staff was given numerous responsibilities, amongst others, monitoring of the assignment traffic and attendance at the hands-on and overall follow-up of the course. Any defaulter was immediately tracked with a phone call to sort out the difficulties if any. All the corrected assignments were returned to him at the MCA by the tutor. These were gone through thoroughly to check the standard of correction, the grades given, the comments, the feedback provided, and the quality of the assignments, etc. before being returned to the officer. The assignments set were in line with police requirements. A turn around time of a fortnight for the assignments was adhered to.

Those unable to attend the hands-on for reasons beyond their control were offered the opportunity to attend at alternative times. Arrangements were made to accommodate them.

Synchronous counselling was also provided to motivate those facing difficulties with the course.

## Outcomes

To date 228 and 235 police officers from cohorts one and two, respectively, have successfully completed the course and been awarded their certificate. These represent a success rate of 76% for cohort one and 78% for cohort two.

The third cohort has presently reached the hands-on phase and plans are afoot to enrol a fourth cohort soon.

Given the success and popularity of the course in Mauritius, the project was extended to the outlying island of Rodrigues, some 350 miles from Mauritius. Sixty five officers stationed there were inducted in November 2003.

The infrastructure for the delivery has been set up there too for a smooth delivery.

## Evaluation

The importance of evaluation in ODL cannot be underestimated. We needed feedback from the first cohort to ensure that our clientele's needs were being met.

The aims of the evaluation exercise were to:

- collect feedback regarding the various components i.e. course material, tutorial/hands-on, administrative support and general perception;
- use the findings to improve the provision for future cohorts.

## Methodology

The evaluation exercise was carried out during the last week of the hands-on sessions. A standard evaluation questionnaire was used to collect the feedback from the participants. The questionnaire was distributed to each participant who filled it in on the spot during the hands-on session before handing it over to MCA staff. Some questionnaires were also mailed. Everything was done to get maximum response.

The questionnaire comprises five sections. The main thrust of each section is as follows:

- Section 1 aims to collect feedback regarding the course materials.
- Section 2 invites feedback about the tutorials.
- Section 3 aims to collect feedback about MCA staff involved with the course.
- Section 4 prompts the participants about the value and effectiveness of the course.
- Section 5 invites comments from the participants toward improving the course.

157 completed questionnaires were received out of 300 distributed. This represents a response rate of 52.33%. Sections 1, 2 and 3 were processed based on a five-point scale while the processing of section 4 was based on a YES/NO response. The last section involved an open-ended question designed to collect suggestions from the participants toward improving the course.

## Findings

In general the findings are positive. They indicate that the course materials are good and appropriate for the level of the audience and self-learning. The flexible mode of delivery comprising a mix of distance learning and hands-on is suitable. Most of the participants are satisfied with the tutorial services and the tutor. They appreciate the services provide by MCA staff and rate these services as being of high standard.

Most of the participants find the course effective and value for money. Several suggestions have been made by the participants regarding ways to further improve the course and its delivery to other police officers. These are now being addressed.

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**A PROPOSAL TO CHANGE THE WAY  
DISTANCE EDUCATION IS ORGANIZED IN GHANA**

## Introduction

Distance learning is not new to Ghanaian educators. “Foreign-based correspondence colleges were the talk and practice in years gone by”. (Ossei-Anto, 2002, p. 1) According to Ossei-Anto:

*“Current ODL providers include University of Ghana (UG), University of Cape Coast (UCC), University of Education, Winneba (UEW), Kwame Nkrumah University of Science and Technology (KNUST), the Ghana Institute of Management and Public Administration (GIMPA), as well as the locations of the African Virtual University. KNUST offers programmes in technology subjects; UG offers humanities programmes, and UCC and UEW offer programmes in education. In the non formal sector, Ghanaian radio and television programmes have provided basic level educational programmes”. (2003a, p. 9).*

As a result of the economic and political mismanagement of educational policies and practices in Ghana in the 60’s, 70’s and early 80’s that led to the brain drain and dearth of qualified Ghanaian teachers in the classrooms, as well as the near collapse of the entire educational system and management – the concept of distance education was conceived to meet one of the challenges of the reforms of the tertiary education system as far back as 1986 and the university provision of distance education began during this era. Sadly enough, according to Ossei-Anto (2003b) *“the Ministry of Education did not offer nor set any guidelines for the articulation of distance education mechanism in the education sector”* (p. 132). The universities took advantage of this open gap to claim they were using DE as a means to:

- affording students the opportunity to work and study whilst at home,
- releasing pressure on residential accommodation,
- allowing adults to divert into other academic areas of interest,
- creating an off-campus channel,
- increasing access,
- sharing cost,
- opening up the field for upgrading and updating,
- meeting family or job or social or educational commitments simultaneously.

[As a result of the ODL initiatives there is now increased access to teacher training, resulting in better-qualified teachers and higher admission rates at UEW and UCC. The development of distance education units in the universities has also resulted in computer literacy among university staff and production of good quality distance education course materials].

## Current Ghana “Disturbing” DE Situation

Despite these modest achievements, there are serious issues and challenges facing higher education in Ghana, especially with the implementation of DE. **Firstly**, the five public Universities [UG, KNUST, UCC, UEW and the University for Development Studies (UDS)] can still **not** cope up, year by year, with the teeming numbers of qualified Ghanaian applicants seeking admission to pursue various courses and programmes of study. This has led, of late, to a proliferation of private universities and other tertiary institutions (at least twelve in number, at the last count in July 2003) each clamoring and wanting to widen the access for successful high school graduates to pursue degree courses but at a higher cost than that prevailing in the public universities. Even with this development and competition, many qualified applicants are still “denied” admission on account of non-availability of, and/or restricted, hostel facilities and classroom accommodation. It is estimated that **each** public university has, on the average, 8,000 students pursuing undergraduate face-to-face programmes of study alone, whilst the corresponding number for the private ones is roughly 2,000.

**Secondly**, because of the acute staff shortage at the university level (primarily due to unattractive conditions on service) the gross enrolment ratio is very high for the public universities with the value of 1:80 (lecturer:students) in some cases.

**Thirdly**, even though the public universities are gradually changing gear to be dual-mode in nature and in practice (especially UEW and UCC), a lot of barriers and constraints are in their way. Notably amongst this is the lack of financial support and commitment by the Ghana government toward meeting the desire of the

universities to improve upon existing infrastructure and capitalize of the “extended arms” of distance education (especially ICT-enhanced ODL) to reach out, and especially, to the over 120,000 teachers at the basic level who do **not** have complete qualifications, but are eager to upgrade their skills and professional competencies.

**Fourthly**, Ghana – the first Sub-Saharan African country to gain independence – is at the crossroads as far as meeting its national needs for professional teachers as to its educational systems is concerned. Ghana, the country that not so long ago could conveniently “export” some of its trained teachers to other African countries, now stands in need of competent teachers at all levels of the educational ladder. The annual turnout of teachers emanating from the conventional teacher-training institutions is woefully inadequate to fill the yawning vacuum and/or dearth of teachers. [The straw of survival now seems to be in the domain of ODFL, propelled into fruition by the employ, use and application of modern and emerging Information and Communication Technologies (Dede, 1996; Kirkwood, 1998; Mishi, 2001; and Daniel & Mackintosh, in press)].

**Fifthly**, desperate as the situation is, various stakeholders – notably the Ministry of Education (MoE), the Ghana Education Service (GES), UEW and UCC – are **independently** supporting, mounting, or running diverse and various distance education programmes and systems to “arrest” the teacher development problems.

**Sixthly**, the universities rely predominantly on print materials for their distance education students. This is usually supplemented by monthly tutorial sessions. The DE books produced are very simple, easy to read, very interesting and attractive. Owing to the fact that the universities operate the dual mode system, the courses belong to the academic departments per se. Consequently, notwithstanding the inherent difficulties, it is the responsibility of the lecturers in the various academic departments, whose courses are offered under the DE programme, to write the course materials themselves. This is to ensure parity of esteem. However, various DE units respectively and independently coordinate the material development – from editing to importation of graphics/illustrations to final proofreading to publication.

**Seventhly**, there is a very slow pace of material development. This is one of the greatest problems that universities’ DE programmes face. Three main factors account for this. In the first place, as already stated above, the study materials are written by the university lecturers who are full-time academic staff of the universities – combining the writing of DE materials with their normal load of teaching, research, community service, and assessing students. This makes it very difficult for these lecturers to have enough time to write the required materials and/or to meet deadlines. This hampers the smooth pacing of the DE programme.

To speed up the pace of writing, UEW, UCC and UG have introduced what is called retreat or conference writing. By this approach a number of writers are taken away from their busy schedules and camped at a quiet place outside the university townships for about one week during which they concentrate only on the writing of their courses. This approach somehow is yet to yield the desired/significant results.

The *second* cause of the slow pace of material development is lack of adequate reward for authors of distance education study materials. The lecturers believe that the levels of remuneration for writing these materials are too low. Because of this they easily leave the writing to attend to other higher income ventures. Another motivational issue is the payment of royalties to writers. As at present the lecturers are not too happy with the practice in which once they are paid for writing the materials, such materials automatically become the property of the university in question. This makes the lecturers get no other further financial rewards by way of royalties. To overcome the problem of lack of motivation, some substantial increments in the writing fees have been made (since January 2003), whilst the issue of royalties is still under discussion at UEW, UCC and UG.

The third factor is that most of the authors do not have access to computers for word processing and so their drafts are handed in a hand-written form. Writing and rewriting before getting a neat draft can be time consuming. As a solution to this problem the universities are assisting lecturers to acquire personal computers on hire-purchase. In addition, the public universities are doing their best to get all necessary help in equipping the various departments and each University’s ICT centre with computers and Internet facilities.

**Eighthly**, to support the distance education students, the universities have separately set up their own Regional Study Centres in different parts of the country, particularly at the regional capitals. These are where the learners meet their tutors for the monthly tutorials and also collect their course books. These centres are



manned by Regional Study Centre Coordinators, and part-time tutors who are employed by the universities. The normal assignment turnaround time is at least month. This is owing to fact that there is a rather unreliable postal system in Ghana, especially in the rural areas, marked assignments are **not** returned to the students by post, but they are rather given back to the students when they come in to the centres for the next tutorials.

Ashamedly, the study centres have **not** been fully equipped with the needed facilities; they lack such solid infrastructure, and basic facilities such as office equipment, tables, desks, telephones, computers, scanners and photocopiers needed for the day-to-day administrative work. Because of this, the universities operate a highly centralised model where DE students' records are kept at one place i.e. at the main campuses of the various universities rather than at the centres where they converge to monthly for tutorials.

**Ninthly**, Distance Education (DE) receives very limited funding in Ghana from the central government. Since the public universities operate the dual mode system, DE has no separate budgetary allocation. Virtually, everything goes in to “cater for” the conventional (face-to-face) students and their programmes. In other words, DE has no line budget. The only provision made for DE is that each public university is given only 2% extra of its total subvention from the government to support its DE programme.

**Tenthly**, the financial problems are worsened by the fact that currently virtually all the DE programmes which the universities are mounting are not based on any economic considerations. The programmes have, therefore, not been cost-effective. No proper costing of study materials, day-to-day administration and learner support system are being done. The main trust for DE in Ghana, at the moment, appears to be to “upgrade the knowledge of students than to generate income”. Regrettably, this has led to the situation whereby DE students pay only token fees which does not cover even half of the cost of production of the print materials.

## **ICT–Way Forward for Technology–Enhanced DE for Ghana**

As a DE practitioner, it is my vision and outmost conviction that Ghanaian universities fully use/integrate ICTs and multimedia into their distance education programmes. To begin with, each public university must submit proposals for the modernization of its Distance Education Unit to the respective University's Strategic Planning Committee for consideration and approval. It is also my prayer that, in the not too distant future, there will be born on the Ghanaian scene a distinctive, innovative mega-university that will operate at the cutting edge of the information and communication technology revolution to the educational needs of Ghana in the 21st century and beyond. Until that happens, there is more work for the existing universities to do and more importantly employing modern methods and techniques of online distance education delivery in all their courses and programmes to meet challenges of education in Ghana. To be able to deliver quality mass distance education, and to promote healthy manpower development in Ghana, public universities must seek out ways and means of securing financial support to acquire and effectively use/employ modern and emerging ICTs to enhance and sustain viable, indigenous, pedagogical revolutions in the delivery and adaptation of Online and Open, Distance and Flexible Learning systems (ODFL) methods and systems, as well as expand and diversify the programmes and make ODFL cost effective.

The entire educational sector must engage on a number of initiatives and bold ventures in the domain of ICT enhancements.

**Firstly**, without delay – and with no excuses whatsoever – the universities must employ ICT-enhanced ODL strategies and must tread the bold path to infuse Information and Communication Technologies into their curricula. The persistent and pervasive influence that ICTs have on organizations, has brought about drastic changes in work culture, which have very important implications for higher education. For example, ICTs have influenced the type of skills students in higher education institutions have to develop as well as the facilities and learning modes opened to them. Other far-reaching implications that ICTs have on higher education are summarized as follows:

- transformation of the management and administration of higher education institutions;
- improving the mechanisms for quality of assurance of learning, teaching and research;
- transforming the degree to which, and the way in which, higher education institutions interact with external organizations;

- the organisation and support of teaching and learning programmes, particularly, the development of educational materials;
- increasing access to quality higher education through Online and Open, Distance and Flexible Learning systems.

**Secondly**, all tertiary institutions' academic and administrative staff should be developed to possess the following expertise:

- knowledge in the use of the relevant educational software packages and ICT systems, and the development of instructional and learning material for online delivery,
- ability to evaluate the impact of the use/employ of ICTs on teaching and learning with the view to devising effective and efficient ways of using ICT resources to achieve learning and instructional objectives,
- in-depth knowledge of where in the curriculum the multimedia (especially network) applications would be desirable and effective,
- appreciation of emerging technologies and ICTs and their influence on social values.

These qualities can be appropriately addressed through electronic transmission of information and interactive computer-based learning environment. ICT usage, as an all-pervasive phenomenon, does not only call for a restructuring of the university's curriculum but it demands that staff, so concerned, change their old ways of managing the business of education, especially distance education delivery methods. The focus should always be specifically on learning with technologies and not learning about technology (Murphy, Anzalone, Bosch, & Moulton, 2002).

**Thirdly**, Ghanaian universities must move away from merely purchasing hardware and software to an integrated information systems environment that ensures the provision of quality and focused user services for its members (teachers, students, and administrators) and external statutory collaborating bodies. This envisaged academic system calls for the provision of a networked environment. A universal connectivity that ensures that every end-user in a distributed processing site can access information online is very crucial here. This would provide the infrastructure that could serve the basis for teaching and learning to take place in a multimedia environment. Members of the various university communities would also build meaningful partnerships among themselves by sharing information resources on the University's LANs and WANs.

**Fourthly**, the infusion of Information Technology into the university's curriculum will enhance teaching and learning outcomes and improve the management information systems of the university. Technology-mediated learning packages, such as student-centered curriculum and electronic collaboration will have to be deployed on the network to engage the learners. This would enhance the levels of interactions of faculty with students, while students have a more personalized learning experience.

Faced with dwindling funding for tertiary education in Ghana, the ever-increasing student population, demand on severely limited resources and the need to address the demands of our distance education programme and the information-based workplace, the objectives of the university to embark on the building an ICT infrastructure should include the following:

- The infusion of Information Communications Technology into the University Curriculum to enhance teaching and learning outcomes and improve the management information systems of the university.
- The deployment of computer-mediated learning packages on the network to engage the learner in order that the learner may take greater responsibility for his/her learning.
- The provision of ICT facilities and enhanced delivery systems for the University's Distance Education programme in partnership with collaborators in the telecommunication industry and the African Virtual University. Without a doubt, ODFL programmes hold the long term solution to the quest of the teaming youth of this country for higher education.
- The use of inter-campus network and the Internet connectivity to provide online services to enhance inter-university (within and outside Ghana) collaboration in the areas of research, shared library and human resources and dissemination of relevant knowledge and information amongst members of the academia of Ghana and elsewhere.
- The adequate preparation of university's products in Information Communication Technologies (ICTs) applications in education in anticipation of the inevitable introduction of computer studies

and information-based activities into the pre-tertiary education curricula. The need for teachers at all levels to be computer literate cannot be over emphasized. The introduction of computer education into all pre-tertiary educational institutions in Ghana is long overdue.

**Fifthly**, university-trained products (especially teachers for the basic and secondary schools as well as the Teacher Training Colleges) are the key to preparing the Ghanaian youth for the information society into which global forces are thrusting us. The necessary computer-literate teachers to implement such necessary innovations in the school system need to be at home with the technology and train appropriately now, before the day of implementation dawn on us. UEW and UCC, in particular, have a duty to organize ICT workshops, in-service training and short-term courses for Ghanaian teachers to orientate them to face the impending changes in the school curriculum, since the country must make the necessary internal adjustments that must include a broad based educational policy to make ICT accessible to every child.

**Sixthly**, there is the need for well-trained system analysts and a core of ICT literate staff to initiate and sustain Information Management System training for all categories of the university staff on each university campus. Such training could centre on the automation of data storage; retrieval and management; decision support systems; databases for academic registration, payment of fees, and processing of results and transcripts. The need for the Finance Section, Students' Affairs office, the Library, Academic departments and the Registrar's outfit to collaborate their activities online need not be over emphasized. This would make university administration and management more effective and efficient.

**Finally**, it must always be remembered that the most successful approach is that successful users of ICTs select a mix of technologies, carefully blending them with each chosen according to specific strengths to meet particular challenges (Vanbuel, 2002).

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## **A DISTANCE EDUCATION SOLUTION FOR KENYA**

*“Obsolescence lies in store for those who cannot, in some manner, adapt to new reality. Universities must find ways to sustain the most cherished aspects of their core values, while discovering new ways to respond vigorously to the opportunities of a rapidly evolving world.”*

## 1. Introduction

### 1.1. Status of HE in Kenya

As a result of the massive increase in enrolment and severe financial cutbacks in the 1980's, universities in Kenya have been forced to devise ways that enable them to not only survive but also remain relevant. Public universities in Kenya have grown from only one constituent college with 572 students at independence in 1963 to six, with a total enrolment of more than 60,000 students. The growth in higher education opportunities in private universities has been phenomenal, from only one in 1980, the number of private universities now stands at 17, with a total enrolment of more than 10,000 students. The “massification” of Kenya's university system has expanded access to higher learning from a small group, as was the case in the 1960s, 70s and the early 80s, to a wider population of Kenyans. Thus, in the 1990/1991 academic year alone, more than 20,000 students were admitted. This was an increase of 184 per cent over the previous year. Although this went a long way in enabling more students to gain admission to the universities, it had far-reaching implications on the quality of education offered. A possible solution to this scenario is to increase access to distance education. Although the Kenya government is committed to distance education (DE) and there are at least three major policy documents and an act of parliament on the same, DE programmes remain tiny components of higher education and government involvement is quite minimal.

### 1.2. Delivery Modes of HE/DE in Kenya

*(a) Institution-based mode of study*

This mode of study includes the full-time residential mode. The student population in this mode grew from 41,825 in 1999 to 42,508 in 2000. It is worrying that as the universities expand, enrolment in the national polytechnics and technical training institutions continued on the decline — enrolment went down by 5.8 per cent.

*(b) Print-based distance education*

Many of the large-scale distance education programs in Kenya can be classified as print (paper)-based distance education; print materials form the primary delivery strategy.

*(c) Mixed mode approach*

Mixed mode programmes such as some of the “parallel” degree courses offered in some Kenyan universities use a combination of face-to-face and distance learning strategies.

*(d) Satellite and web-based mode*

In Kenya it is only the African Virtual University (AVU), which uses this technology involving enhanced distance education delivery mode.

### 1.3. Need for Alternative Modes of Delivery

A number of factors justify the need for an alternative, more affordable mode of delivery, among them the steady reduction in the funding of public universities, the need to expand educational opportunities to significantly larger numbers of school leavers and major changes in the labour market which create new requirements for lifelong learning. These and related factors have led to new trends in distance learning in higher education in the country.

## 2. Constraints to Technology-Enhanced Distance Education in Kenya

Despite the fact that several institutions in Kenya have attempted to provide DE, the approach has followed the more traditional system of delivery, also distance education in Kenya is not a major component of university education, although its importance has been acknowledged. A technology-enhanced delivery sub-system will face a number of constraints, which include:

*(a) Resource mobilization*

Poor resource mobilization hampers the development of the system at the national level. Since the government does not have a distance education policy for higher education in place, there is no specific provision for distance education in the overall national budget. As a result, universities have to generate funds for running programs. In most cases, money generated from Distance Education programs subsidize other conventional programs. Furthermore, innovations in distance education have heavily relied on unsustainable sources of funding, especially donor funding.

*(b) Electricity supply*

Despite the fact that electricity supply is normally taken for granted in many countries and is not an impediment, in Kenya the electricity network is mainly concentrated in towns and a sizeable area of the country, especially in the rural, currently does not have adequate electricity supply. Only about 10% of the Kenyan homes have power, largely in the urban areas. Provision of electricity is irregular and sometimes non-existent in some areas. Consequently, modern electricity-dependent technologies are not available. This poses a challenge in the delivery of DE in these areas.

*(c) Personnel*

Competent academics are available in Kenya, their number, however, appears to be comparatively small and the distribution of this small number of competent people across the distance teaching units may not lead to effective utilization of their talents.

*(d) Medium of instruction*

Although English is one of the two official languages of Kenya playing a dominant role in administration, education, journalism and business, the mastery of English by a majority of Kenyan teachers is regrettably low. Poor mastery of English, which is the medium of instruction, inevitably slows down the speed of distance education development in Kenya.

*(e) Clear understanding of distance education*

Some of the key players in distance education like Ministry of Education staff; Vice-Chancellors, Deans and Directors do not understand principles and application of open and distance education. This creates a serious gap in policy planning and implementation.

*(f) Internet connectivity and telecommunication costs*

Technology-enhanced distance education relies heavily on the Internet for the delivery of courses and the digital library for reading resources. Unfortunately, slow Internet connection and low bandwidth in Kenya will mitigate the effectiveness of this mode of delivery. Also, Internet Service Provider (ISP) subscription charges vary greatly, largely reflecting the different levels of maturity of the markets, the varying tariff policies of the telecom operators, the different regulations on private wireless data services and on access to international telecommunications bandwidth.

*(g) Skilled information communication technologists*

Most university academics and students have very low skills in ICTs to the extent that digital libraries, E-learning platforms and many other products are not fully appreciated by faculty members.

*(h) Attitude toward technology-enhanced learning*

Many academics from universities in Kenya do not believe that quality education can be delivered through information technology, and some of them are very slow in changing attitude toward this



kind of modern distance education. Indeed many scholars cannot easily adopt “a mind set” which appreciates that digital literacy is an important dimension of learning like “reading and writing”.

*(i) Communication policy*

Due to lack of circuit capacity, obtaining sufficient international bandwidth for delivering web pages over the Internet is still a major problem in Kenya. The problem is exacerbated by the National Telecommunication organ (JAMBONET), which has the sole monopoly on international bandwidth. This scenario poses a major challenge to proper functioning and delivery of technology-assisted DE in Kenya. Also, DE delivery in Kenya will severely be hampered by communication regulations that currently do not allow a two-way satellite-based Internet services using VSAT technology.

*(j) Computing resources*

Computing resources, both hardware and software are expensive for any university to afford in reasonable quantities and quality. Technology is very dynamic and some universities cannot cope with these changes in terms of cost and relevancy.

### **3. The Way Forward for Technology-Enhanced Distance Education in Kenya**

It is a big challenge to appreciate that effective distance education can be delivered via modern technologies, especially in a developing country like Kenya. For technology-enhanced distance education to succeed in Kenya, government, universities, industries and NGO's all have a role to play as stakeholders. In addition, the following will need immediate attention if Kenya is to develop a sustainable technology-assisted indigenous DE delivery systems:

*(a) Distance education policy*

From the analysis it is clear that there is a lack of coherent policy for distance education at the national level. Consequently, distance education programmes in higher education are generally disjointed and run on an ad hoc basis. The government needs to develop and articulate national policies for the development of distance education.

*(b) Capacity building*

We need to build capacity at policy level, institutional level, and individual level. Retraining of the Academic and the non-academic staff working in institutions of DE with a view to creating an environment where scholarly pursuits, academic excellence and intellectual adventures will command respect. Also, training on new suitable delivery technologies to enhance quality and content of courses offered using the distance education mode. This is important because distance education delivery methods have improved dramatically through the use of modern technologies. Also, there are very few Kenyans with expertise in core areas of distance education such as; Needs Analysis, Curriculum Design and Development, Course Writing and Editing, Research Evaluation and Quality Assurance.

*(c) Relevant curriculum*

Is it important to have curriculum responsive to Kenya's educational needs? A curriculum, which provides for Kenya's labor needs, which addresses or even alleviate the plethora of problems of lack of high-quality manpower experienced in Kenya?

*(d) Media of instruction*

It is important to diversify the media of instruction to include meaningful, and interactive content on the Internet to combat the view that technology is western and represents a foreign “culture”. In Kenya, content can also be in the national language “Kiswahili” and some could be in local languages such as Kikuyu, Luhya, Kamba, Luo, and Kalenjin. This will make the programmes more indigenous and popularize them in areas where English is not spoken well.

*(d) Appropriate and usable ICTs*

The low technologies ICTs, including radio and television, are common tools that have been used for open and distance learning for a long time, their use should be enhanced and merged with high technologies ICTs like the Internet, VSAT, etc. It is proposed that a satellite-linked network be used to enhance DE activities offered by Kenya. The purpose is to facilitate real-time video (synchronous) and pre-recorded on video (asynchronous) lectures and other educational materials to be relayed initially to six remote terminals (RT) within Kenya from the Main Base to be located in Nairobi. The problem of poor electrical network can be solved by use of solar power. It is important to note that the technology involving a satellite link is now available and is no longer exorbitantly expensive.

*(e) Other intervention strategies*

- It is important that any new DE initiative should also offer courses in sciences, engineering, business and medical fields.
- Improve access to DE programs by making them affordable, widely available especially in rural Kenya and relevant to current Kenyan manpower needs.
- Ensure quality assurance monitoring mechanisms are upheld.

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**DISTANCE EDUCATION (DE) IN GHANA.  
PROBLEMS AND THE WAY FORWARD**

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## Introduction

In an attempt to discuss the proposed National Distance Education in Ghana, brief definition of DE and the effect of ICT on its delivery will be highlighted. There have been many definitions for DE but few of them will be used in this article. According to Holmberg, the term 'distance education' covers the various forms of study at all levels which are not under the continuous, immediate supervision of tutors present with their students in lecture rooms on the same premises, but which, nevertheless, benefit from the planning, guidance and tuition of a tutorial organization. (Holmberg, 1997:9) Distance teaching may be defined as the family of instructional methods in which the teaching behaviours are executed apart from the learning behaviours, including those that are in contiguous situations would be performed in the learner's presence, so that communication between the teacher and the learner must be facilitated by print, electronic, mechanical or other devices. (Moore, 1973:664) Distance education is education which either does not imply the physical presence of the teacher appointed to dispense it in the place where it is received, or in which the teacher is present only on occasion or for selected tasks. (Loi 71.556 du 12 juillet 1971) From the above definitions, DE therefore, is the type of education which is not conventional face-to-face but take place through print, electronic and other means. With the arrival of the new ICT, the delivery and the feedback in DE will be enhanced. It will help remove isolation in students to some extent and improve accessibility.

## Current Situation of Higher Education in Ghana

The current education in the country could not be discussed without giving some prominence features of education in the country.

These are:

1. The illiteracy rate in the country which now stands at 35%.
2. Secondary education enrolment is only 37% of the relevant age-group.
3. Post-secondary education enrolment is only 1%.

The figures in 2 and 3 above are likely to increase at the end of 2003 academic year due to increase in the enrolment figures in senior secondary schools as shown below. Ghana has serious capacity problems in education at the senior secondary schools as well as the universities. For example, out of 150,000 students at the basic education level who passed to be admitted into the senior secondary schools in 2002, only 70,000 could be admitted due to infrastructure problems such as accommodation and classroom facilities. The five universities can only admit 40% of qualified applicants due to the same infrastructure problems.

## The University of Cape Coast (UCC)

The University of Cape Coast was established in 1962 out of a dire need for highly qualified and skilled manpower in education to provide leadership and enlightenment. Thus, it was established to train graduate teachers for second cycle institutions, Teacher Training Colleges and Technical Institutions, a mission that the two universities that were in existence were unequipped to fulfill. The university has since its establishment added to its functions, the training of educational planners, administrators and agriculturists. The university is, therefore, playing a role that is unique and vital to the education enterprise of the nation. In pursuance of its mission, the university has been responding fully to the changing needs of the entire education system in the country. It has also restructured its degree program from B.A., B.Sc. and B.Ed. in education to B.A./B.Sc. with non-education content and a B.Ed., which is a professional qualification in education. This is to allow flexibility and choice in its course offerings, and thus, cater for specific needs of the students, while still focusing on its mission. The Distance Education unit in the university is responsible for the Distance Education courses. The number of students doing Distance Education course has been shown in a table earlier on in the article. The dominant delivery model is the print material. The main character of the distance learning in UCC is the usage of dual mode and absence of single and mix modes.

## The University of Ghana (UG)

The University of Ghana was established in 1948 as the University College of the Gold Coast, an affiliate college of the University of London. Following independence in 1957, the university was organized as the University

of Ghana and, in 1961, began to award its own degrees. The university's outstanding lecturers and distinguished alumni have earned it considerable national and international prestige. It has seven faculties made up of departments and has student population of about 18,000. Due to its excellent reputation, the university has a history of attracting foreign students, particularly students from United States. The university is located on a park-like campus in Legon about 12 kilometres from the centre of Accra, the capital. The University of Ghana is a member of the International Association of Commonwealth Universities (ACU) and the Association of African Universities (AAU). The university has also established academic and research links with several universities and research institutions world-wide. In addition, the university has also been linked to the Norwegian Universities' Committee for Development Research and Education (NUFU) and Council for International Educational Exchange (CIEE) based in New York. The academic program integrates students into regular university courses in a wide range of disciplines. The programme begins with an on-site orientation which helps familiarize students with course registration and university procedures; provides an overview of local customs, culture, politics, religion, and social roles; and covers logistical issues such as housing, banking, and medical care. Course work is recommended in development studies, natural sciences, and African studies courses in the arts, humanities and social sciences. Main character of the distance learning in UG is the usage of dual mode and absence and single and mix modes.

### **Kwame Nkrumah University of Science and Technology (KNUST)**

Founded in 1951, KNUST is located on a spacious campus of gentle knolls seven miles from the centre of Kumasi on the main road to Accra. The university is pleasantly situated in a part-like setting, and newer amenities include an Olympic-sized swimming pool, a new telephone exchange, banks, shops, and a large library extension that is under construction. The university enrolls about 5,000 students every year and has nearly 500 faculty members. Selected EAP students may take their spring semester programme at KNUST following the fall semester at the University of Ghana. This option will be available to qualified and adequately prepared students in certain fields, including African art (history and studio), environmental and development studies, agricultural economics, and the related fields of forestry/agroecology/wildlife ecology. Only students who have demonstrated serious academic motivation and personal maturity during the fall semester will be permitted to attend UST in spring. During the spring in Kumasi, UG students are expected to enroll in approximately 4 to 6 classes. A typical course meets four hours per week for lectures and has an additional lab or tutorial component, including opportunities for visits to areas where faculty are conducting research. UG students have access to courses in the following areas: The College of Art, the Faculty of Agriculture, the Faculty of Environmental and Development Studies, the Institute of Renewable Resources. Main character of the distance learning in UST is the usage of dual mode and absence of single and mix mode. Distance learning technologies, which is used in UST, is print material.

### **University of Education – Winneba (UEW)**

The University of Education, Winneba was established in 1992. This was a result of Government's Tertiary Education Reform Programme which was launched in 1988 in association with the Education Reforms at Basic and Senior Secondary Levels. The university is a product of seven diploma-awarding colleges coming together to constitute a single integrated complex. Three of these colleges – Advanced Teacher Training College, Specialist Training College, and National Academy of Music – already existed in Winneba and, thus, became the three campuses of UEW. The School of Ghana Languages and the College of Special Education moved from their respective towns to Winneba. Two more colleges, the Advanced Technical Teacher's College (Kumasi) and the Agricultural Training College (Mampong) have now been integrated into the university. The University of Education, Winneba, is a teacher-training institution. This institution has been at the forefront of teacher training in Ghana. In the institution's attempt to respond to children's difficulties, and to promote effective teaching and learning, the School Attachment Programme was introduced. Main character of the distance learning in UEW is the usage of dual mode and absence of single and mix mode. The table below gives an appreciation of numbers of educational institutions and enrolment figures.



## Table of Enrolment in Public Institutions in Ghana

Institution	Year	Total Number	Enrolment
Senior Secondary Schools	1999/2000	465	194,785
	2001/2002	477	253,290
	2003/2004	476	334,661
Polytechnics	1999/2000	8	12,853
	2001/2002	10	20,442
	2002/2003	10	23,117
Teacher Training Colleges	1999/2000	38	21,410
	2001/2002	42 (4 Private)	18,766
	2003/2004	42 (4 Private)	25,200
Universities in Ghana	1999/2000	5	34,000
	2001/2002	5	60,000
	2003/2004	5	59,000

Note: The figures in the table for the universities are mainly for conventional face-to-face students.

## Enrolment of Students Participating in Distance Education in University of Education, Winneba (UEW), and University of Cape Coast (UCC)

Institutions/Programmes	Male	Female	Total
UEW			
B.Ed. (1998/1999 Batch)	87	109	196
B.Ed. (2000/2001 Batch)	46	62	108
OVERALL	133	171	304
UEW			
DBE(January 2002 Batch)	585	611	1096
DBE(January 2003 Batch)	1013	1349	2362
OVERALL	1598	1860	3458
UCC			
DBE (2001/2002 Batch)	480	270	750
DBE (2002/2003 Batch)	1435	1087	2622
DBE (2003/2004Batch)	3791	2811	6602

Source: Dr Ossei-Anto, Director of Distance Education Programme at the University of Education, Winneba, and Mr Albert Koomson, Director of Distance Education Unit of the University of Cape Coast.

## Extent of Distance Education Provision

The University of Cape Coast and University of Education, Winneba, provide distance education in teacher education. The Kwame Nkrumah University of Science and Technology provide distance education in pharmacy whiles the University of Ghana provides distance education in Youth programmes. Plans are far in advance to introduce other disciplines into the university programmes.

## **Dominant Delivery Models Used for Distance Education**

The dominant delivery model used in distance education (DE) at the higher institutions is the print materials. However, the four universities involved in distance education are working very hard to introduce ICT, the online approach into the delivery mode. It is hoped that with the introduction of the ICT in the DE at higher institutions will go a long way to improve the delivery method, tutor effectiveness improve administration effectiveness, provide appropriate teaching tools as well as the enhancement of accessibility.

## **National Policy on Distance Education**

Unfortunately, there is no national policy on distance education as at now. A committee has been established in the Ministry of Education to work out the modalities for the Distance Education Policy.

## **Barriers to be Broken**

The barriers to be broken under the DE delivery method are infrastructures, staff quality, financial support, learner support services and media/tools.

### **Infrastructure**

Challenges in DE delivery in Ghana is physical infrastructure such as proper school building facilities, lack of electricity, specifically in the rural areas, communication hampered by lack of telephones or e-mail and poor roads. These barriers need to be addressed if Ghana wants to roll out DE, especially with the ICT approach in future.

### **Staff Quality**

Most of the teachers involved in the DE delivery are not properly trained to effectively execute their work. A lot of them have limited exposure to new competencies (e.g. ICT).

### **Financial Support**

There is no financial support from the government toward the organization of DE in the higher institutions. This has led to every institution organizing funds toward the running of the DE on individual basis.

### **Learner Support Services**

These services are non-existence either physically or financially. Lack of libraries books, computers, print materials at the teaching centres needs to be addressed.

### **Media/Tools**

Appropriate books for the courses, computers and their accessories, access to Internet facilities are all problems to be tackled.

## Proposed National Distance Education Strategy for Ghana

It is envisaged that DE in higher institutions will in future override the current conventional face-to-face education. It is also hoped that ICT will play an important role to replace the traditional approach in the delivery of DE in our higher institutions. It is also our hope that one of the higher institutions, if not all will rise to the status of a mega-university. In order to achieve the above strategies, the above barriers should be overcome. How should it be done? The government should be called upon to assist in every bit of the barriers mentioned above. The government alone cannot support all these obligations single-handedly, and therefore needs support from development partners, like UNESCO, USAID, UNICEF, DFID, JICA, CIDA, NGOs, private business men and the District Assemblies in the country to help put the DE idea into fruition. It is through the DE approach that will give improved accessibility of education to the people in the country. Ghana can leapfrog stages of development by investing into fully digitized networks rather than continuing to expand the outdated analog-based infrastructure (Braga 1998).

## Conclusion

The current state of education in Ghana is facing some issues that results in low adult literacy and a lack of middle skilled labour. An ICT-based distance education can play an important role in addressing some of the root causes of these problems, but success will depend on overcoming a number of serious barriers. Overcoming these barriers will require the support of a range of local stakeholders coordinated by a dedicated global partners filling the gaps. A bold implementation plan is envisaged, and will require significant resources and attention from all stakeholders to ensure the desired impact is achieved.

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**THE OPEN UNIVERSITY OF TANZANIA.**  
**THE AFRICAN VIRTUAL UNIVERSITY (AVU)**

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## Introduction

The African Virtual University (AVU) is a concept of distance education, which uses technological mode of instructional delivery, i.e. it uses satellite telecommunications network established to serve the countries of Sub-Saharan Africa (SSA). It's the concept, which was hatched and funded by the World Bank. It is an African network currently coordinated from Nairobi in Kenya as the Headquarters in Africa. Eleven Anglophone countries are taking part as AVU learning centres, i.e. Ethiopia, Ghana, Kenya, Mozambique, Namibia, Nigeria, Rwanda, and South Africa, Tanzania, Uganda, Zimbabwe.

The demand for educational services in Africa is huge. It is driven by five main factors: a large pool of tertiary age school graduates, many of whom cannot enrol in university because of limited capacity; a growing willingness to pay for education and training; several strong regional and sub-regional academic networks; a large labour force that requires skills upgrading; and a growing digital divide between Africa and the developed world.

The African Virtual University seeks to contribute to ongoing efforts to strengthen education in Africa by harnessing power of modern information and communication technologies to position Africa in a wider global knowledge society. In doing so, AVU will leverage synergies and build partnerships with other initiatives such as those by the Association of African Universities (AAU) as well as leading institutions of higher education in Africa.

At the Open University of Tanzania, the African Virtual University started in July 1997. AVULC (African Virtual University Learning Centre) is under the guidance of the VC of Open University of Tanzania. However, AVU Campus Coordinator coordinates the centre through the AVU Business Manager and the AVU Technical Coordinator. All of them are employees of the Open University of Tanzania.

## The Way Courses are Conducted

When the World Bank was funding AVULC, the Open University of Tanzania was conducting live session on short courses, which were organized by AVU in collaboration with the course organizing institution. Currently, the World Bank is not funding the Learning Centres. The university in collaboration with AVU offers short courses through video tapes, CD-ROMs and WEBCT. The participants for the short courses are expected to communicate with the course instructor from the organizing institution through e-mail and chatting, which is arranged for participants wherever they are on the selected day and time, for participating countries. The face-to-face sessions are organized at the centre by the selected qualified facilitator to run the course.

## Short Courses Offered at the Centre

1) Continuous Computer Literacy courses which are organized at the Centre. Four modules, of which each takes two weeks, are taught.

The modules are:

- Introduction to Computer System, the Internet and Microsoft Word.
- Spreadsheet using Microsoft Excel 97/2000.
- Database Management using Microsoft Access 97/2000.
- Microsoft PowerPoint for Windows 97/2000.

2) AVU short courses offered.

A) Information Technology Master Certificate offered by the New Jersey Institute of Technology (NJIT).

The courses are:

- (i) A+ PC repairs Certificate Course, Managing and Maintaining
- (ii) Web Author

- (iii) Web Developer
- (iv) Web Manager
- (v) Visual Basic Programming
- (vi) Graphics /Multimedia

B) Certificate in Journalism offered by the Indiana University of Pennsylvania.

The courses are:

- (i) Introduction to Basic Journalism Skills
- (ii) Community Journalism
- (iii) Public Opinion Polling
- (iv) Editorial Process
- (v) Communication and Journalism Research Methods

C) Professional Business English Communication offered by the George Town University.

The courses are:

- (i) Business Communication: Entrepreneurship and Innovation
- (ii) Business Communication: Human Resources and Employee Motivation
- (iii) Business Communication: Survey of Professional English Communication
- (iv) Business Communication: Organizational Structure
- (v) Business Communication: International Management and Globalisation

## AVU Degree Courses

The Open University of Tanzania was approached in September 2003 by AVU on the possibility of conducting AVU degree courses in January 2004.

The Management of the university asked for more time to prepare ICT facilities, so therefore, looking on the possibility of joining in January 2005.

The degree and diploma course expected to be offered are:

- (i) Bachelor of Science in Computer
- (ii) Bachelor of Business Administration and Management
- (iii) Diploma in Computer Science
- (iv) Diploma in Business Administration and Management

## Students Participation

The AVU Headquarters in Nairobi, Kenya, communicates with the course providers, and the Learning Centre promotes and markets the courses to get participants. Most of the participants are those who are working in different organizations. Since the courses are effective in building their own capacity, students participate fully. The courses are usually conducted once per week between eight and ten weeks. The courses attendance time is three hours for the IT Master Certificate Course and 11.5 hours for the Journalism and Business English Communication Courses. The starting time for every short course on the delivery day is from 5.00 p.m., this is after working hours.

The courses are offered through videotapes and CDs which are sent to the Learning Centre. The facilitator at the Centre guides the participants on how to use the study materials.

They get an opportunity to ask the Instructor questions through e-mails or during chat which is organized on a specific day.

Participants are given assignments, and they post their answers through e-mails.

At the end of each course the participants sit for an examination, which is sent to the Instructor for marking, and all those who pass are awarded with certificates.



A total of 3,041 participants have participated in the AVU short courses at the Open University of Tanzania Learning Centre since June 1997.

### **Problems at the Learning Centre**

1. The condition of the Infrastructure at the Open University of Tanzania (OUT) Learning Centre is not conducive for learning especially in terms of ICTs, offices and rooms for ICT laboratories.
2. The university has 22 Regional centres all over the country which are not yet connected with ICT facilities. Currently the Headquarters in Dar-es-Salaam is running the AVU short courses using very few almost obsolete computers of Pentium 1 and DEL 486.
3. The late arrival of the materials from the facilitating institutions and the late postings of the materials in the WEBCT affect the running of the courses in time.
4. Power interruptions at the Learning Centre, when a session is in progress or during chat time highly affects the training.

### **General Challenges**

1. The Open University Learning Centre (AVULC) aims at making sure that the educational gap between world scientists, business managers, businessman, journalists, university students, high school teachers, secretaries, civil servants, bankers, etc. is bridged. This will be achieved by offering capacity building short courses and degree courses, if the learning environment and ICT-infrastructure are in place and attractively conducive to realize the goals.
2. Plans are underway to install the LAN and WAN at the university after getting funds from the Tanzania Education Authority. This will ease the communication between the Headquarters and the 22 regional centres.
3. To have a well-equipped computer laboratory, which will be used in the facilitation of the courses, offered by AVU is one of the major goals of constructing ICT infrastructure at the centre.

### **Specific Future Plans Challenges**

1. To procure enough educational media, including ICT equipment and other related facilities at the Head Office in Dar-Es-Salaam and the 22 regional centres. This will include computers, printers, scanners and various software for delivering the courses.
2. Placing teaching and learning materials on the network for OUT students and any other interested user of the materials.
3. Web page authoring and updating within OUT and its regional centres and other institutions and organizations.
4. Installing link network with educational institutions of higher learning in Tanzania, Africa and worldwide.
5. Training OUT staff on the use of ICTs in their respective areas of work and specialization both academic and administrative workers.
6. Installing and connecting all the regional centres to the computer network of the academic and administrative at the Head Office in DSM.

7. To utilise the funds obtained as fees from participants attending the short courses to buy new facilities for the Computer Laboratory, this will replace the low version Del 486 and Pentium I and II computers, which are still in use at the university.
8. To have in place a digital library at AVULC which will be open not only to AVU students, but also to the rest of the University community engaged in distance learning.

In conclusion the current situation of ICTs at the Open University of Tanzania is a serious challenge. More participants in the short courses will be attracted to be enrolled if the modern facilities will be available. It has, therefore, to be more dealt within collaborative efforts between AVU, the course organizing universities and the Open University of Tanzania than on stand-alone basis, which is too expensive.

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**BARRIERS IN THE USE OF ICTs  
IN HIGHER DISTANCE EDUCATION IN ETHIOPIA**

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## Higher Education in Ethiopia

The government of Ethiopia is on the implementation of the Second Education Sector Development Programme (ESDPII) since July 2002. The Education and Training Policy that the ESDPII is based on, focuses on increasing access to educational opportunities which enhanced equity, quality and relevance.

According to a publication of the Ministry of Education, the total enrolment in higher education institutions in 2002/2003 is recorded to be 101,829 in all programs – regular, evening and summer, this shows an increase of 16.5 in access compared to the previous year. Out of this, non-government institutions have 19,091 students, which account for 18.75% of the total.

Currently, there are about five universities and 18 colleges owned by the government. In the private sector, there are more than 12 accredited colleges.

When we come to see distance education in the country, we can understand that there is a lot to be done in this aspect.

A number of private institutions are running distance programs that share insignificant number of students. There are also NGOs that coordinate distance programmes in the country. Addis Ababa University (AAU), for instance, has a programme for teachers throughout the country that is run in cooperation with the United States Agency for International Development (USAID). UNESCO-IICBA is also running distance postgraduate courses for teacher trainers in cooperation with universities like Indira Gandy National Open University (IGNOU). All these distance programmes are conducted in the traditional, paper based correspondence mode of teaching. The use of ICTs in distance education is not yet applicable here.

In the case of the African Virtual University, we see the use of digital ICTs like video and teleconferencing.

## Problems in the Use of ICTs in Distance Education

There are mainly three reasons for the lack of the use of ICTs in the distance programmes in the country.

**Orientation (Initiation):** Lack of knowledge on the fact that ICTs are there to support the Education Sector, is the biggest problem. Policy makers and educational administrators should first understand or believe that we can use and rely on ICTs to securely run distance programs.

**Infrastructure:** There seems to be two conflicting issues here. Distance education mainly exists to reach to people that are too far physically from the institutes, in the rural parts of the country in our case. And it is the rural parts that lack the necessary infrastructure to use ICTs.

**Required resources and skills:** In the constantly and rapidly changing ICT world, a sustainable resource of ICTs and the necessary skills to use them is vital. Even if the above two points were solved; the necessary and equally important part is still missing here. There is no enough manpower and skill to use the current technology there along with updating knowledge with the ever changing phenomenon.

With the increasing attention ICTs are getting from different organizations in all sectors, the future of ICTs in respect to their application in higher distance education looks brighter. A number of computer training centres are opening, government organizations are automating their services, and banks are now using Wide Area Networks (WANs) to facilitate their services. These examples show us that ICTs are slowly moving into the different fields of activities.

The Ethiopian government should play a significant role in solving the above three problems. Universities and colleges should be encouraged to use digital ICTs to conduct distance education.

The establishment of a new government organization dedicated to distance education would have related problems improved.

A number of NGOs are trying to equip teacher-training institutes and colleges with the necessary technologies. USAID has been distributing computers for these institutes throughout the country, and it has also been offering trainings on ICTs. UNESCO-IICBA has also run a number of trainings on the “development of educational CD-ROMs and web sites” so that these institutes would be able to produce their own distance education materials. UNESCO-IICBA has also conducted a pilot project called “Edukiosk”. The idea is to use world space satellite radio receiver for information downloading to computers. This has proved to be cheap and useful technology.

I believe the problems in relation to infrastructure are being tackled through time. But government should support this in a better way. Ethiopia currently has very poor Internet connectivity. There is a growing demand for the Internet. Government is also trying to promote the use of the Internet by reducing subscription fees, but the biggest problem in this regard is that there is only one ISP in the country. Private companies are pushing to get into the market, which I believe would have been a great advantage, but none has succeeded so far.

To conclude the above points:

- Distance education would be a great help in the country to achieve government’s and UNESCO’s goal of “Education for All” by 2015.
- There is no arguing that digital ICTs can facilitate distance education. But the challenge in Ethiopia and most developing countries is that decision-makers and educational administrators are not well oriented with the role ICTs can play in distance education. The National Commission for Science and Technology can make difference in this aspect by promoting ICTs.
- The Ministry of Education should establish an organization solely responsible for distance education. This way the use of ICTs can also be encouraged easily.
- The price of computers is going down. But the Internet should be available for every educational institute. The Ethiopian telecommunications corporation should upgrade its services or should allow private companies to share the market.
- NGO’s role is needed in providing trainings to boost the required skills in the implementation of distance education.

**Proposal:** The introduction of ICTs can get the attention of decision-makers and administrators. By creating a discussion forum for instance, and invite people to participate in the discussions, the potential of digital ICTs will be recognized and emphasized.

**Content:** There is no portal on educational institutes of Ethiopia currently. This web portal would be a centre for resources, information on the institutes, current activities and future plan and so on. This portal can also incorporate a discussion forum, which will make people visit the portal more frequently.

I believe the development of a portal like this will have a great impact in promoting ICTs and introducing its applicability in distance education to the decision-makers and administrators of education.





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# **CURRENT SITUATION OF HIGHER EDUCATION IN SOUTH AFRICA**

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The new Higher Education Act passed in 1997 by the South African Parliament was the culmination of a process which began in January 1995 by the previous South African President, President Nelson Mandela. The President then appointed a National Commission on Higher Education (NCHE) to provide the new government with a policy framework for the fundamental transformation of South Africa's higher education sector. According to the Association for the Development of Education in Africa (ADEA), the rationale for setting up NCHE was that the previous higher education sector was a racially fragmented system, with enormous disparities between historically black and historically white institutions in terms of facilities and capacities. The system thought to have had gross distortions and inequities which included a lack of equity in the distribution of resources to institutions. It was also felt that it had a skewed distribution of the student population in the disciplines, with no more than a handful of non-white students in fields such as the sciences, engineering, technology and governance characterized by fragmentation, inefficiency, and ineffectiveness. However, despite the negative consequences of the apartheid legacy, the system as a whole is the most developed in Africa, with substantial resources. Some institutions had developed internationally competitive research and teaching capacities. These valuable features and achievements needed to be retained. But the system's inequities, imbalances, and distortions needed to be addressed in order to meet the challenges of a non-racial democratic society. South African NCHE involved higher education stakeholders in the process of formulation of the country's new higher education policies. The core work of NCHE was, therefore, undertaken through five task groups. The task groups' work was supported by a number of technical committees and working groups. The commission's investigation centered around the following issues:

- analysis of the existing situation;
- future needs and priorities;
- governance;
- financing;
- institutional and qualifications framework.

The new South Africa's Higher Education Act and Education White Paper 3 (1997) reflect the following key recommendations as proposed by the NCHE, which can be summarized as follows:

- The expansion of student enrolment as well as access in higher education need to be broadened to reach a wider distribution of social groups and classes, including adult learners. This key recommendation is central to the framework underpinning the transformation of higher education in South Africa;
- Efforts need to be made toward greater responsiveness to societal needs and interests;
- Identification of a need for increased cooperation and partnership in the structures of governance, both at the system and institutional levels.

With the inception of the new Higher Education Act many universities began to open their doors to students of all races. Now, South African universities are lively, multicultural places of learning, where diversity is celebrated. Many of the historically white universities now have a majority of black students. Whereas in the past most higher education students in the country were white, now, nearly 60 percent are black. Statistics from 2000 show that of the total number of 345,403 students in universities and technikons, 178,654 were African, 122,461 were white, 15,853 were colored and 28,054 were Indian. The process to restructure the higher education system began in 1990. The National Education Policy Investigation of the early 1990s and the National Commission on Higher Education of 1995 to 1996 explored ways of bringing in more black, particularly female – students into the higher education sector. The Higher Education Act of 1997 created the framework for a restructured system followed by mergers and closures of institutions. The National Plan for Higher Education, unveiled in March 2001, set down targets for a reworked system with regard to size and shape. The size and shape of the higher education sector is being transformed into a more equitable one that better meets the country's human resource requirements. The plan is to steer more students into the sciences and embark on an equity drive to compel institutions to open their doors to more black, women, and disabled students and staff, by withholding funding if they do not comply. As part of the restructuring plan to eradicate duplication and establish centres of excellence, some institutions are likely to close or merge with others.

## **Transformation of the Higher Education Sector**

With the move toward the transformation of the higher education sector, debates are currently focusing more on the need for more vocation-oriented, technical education to address some of the skills shortages in the country. Some of the key goals of the National Plan for Higher Education include:

- increasing the number of students in the system over the next 10 to 15 years;
- increasing the number of black and female students in areas where they are under-represented;
- reducing the number of higher education institutions from 36 to 21.

National Working Group was appointed by Education Minister, Professor Kader Asmal, in April 2001 to come up with specific proposals on institutional mergers and collaborative arrangements between institutions for each region in the country.

## **Recommendations on Some Mergers and Closures**

Headed up by New African Investments Ltd. chief executive Saki Macozoma, the National Working Group released its detailed report in February 2002. The recommendations for mergers and closures were met with some resistance, particularly from some of the historically black institutions that will bear the brunt of the restructuring plans, unlike the advantaged, historically white institutions that have mostly been left intact. The following are examples of how the restructuring process affected some of the higher education institutions per province: The Eastern Cape Province Rhodes University and the University of Fort Hare are to merge and incorporate the medical school of the University of Transkei (UNITRA). The rest of UNITRA is set to close. University of Port Elizabeth and Port Elizabeth Technikon are to merge as are Border Technikon and Eastern Cape Technikon. Gauteng Province Technikon Northern Gauteng, Technikon North-West and Technikon Pretoria are to merge. KwaZulu Natal Province, The Universities of Durban-Westville and Natal are to merge; University of Zululand is to offer more technikon-oriented education; merging of ML Sultan, Natal and Mangosuthu Technikons. Northern Province The Universities of Potchefstroom and North West to merge. Western Cape Province The University of the Western Cape and Peninsula Technikon are to merge. Other distance education institutions, that is, University of South Africa (UNISA), Technikon SA and Vista's Distance Education Centre are to merge as from January, 2004. The rest of Vista University Campuses will be incorporated in other institutions. The major advantages of having the three distance education institutions merged are that they all will come into the merging partnership with a wealth of information communication technology resources. This will enable new comprehensive institution to deliver cost-effective mass-based programs, not only in South Africa, but throughout the world. It has been recently announced that the new comprehensive institution will be the University of South Africa (UNISA). With the current technology, the new UNISA will have great potential to break the barriers that are currently causing the digital divide among learners, particularly in the remote and rural areas.

## **Barriers or Constraints Pertaining to Technology-Enhanced Distance Education in Your Country**

Information and communication technologies are rapidly changing the way individuals live, firms do business, governments administer and nations interact. While the optimists tout a Global Information Society with benefits for all, the pessimists paint a gloomy picture of a world split even further apart between the information technology haves and have nots. What is clear is that governments recognize that no country will be left untouched by the information revolution. Most countries are engaging in initiatives and formulating policies to maximize their potential to implement the new technologies. South Africa cannot be left wanting. It has already embarked on a path that among other things will likely lead to a national policy for information technology. A successful information communication technology policy needs to be consistent with overarching national goals and objectives of that country. It should also be grounded in the reality of the state of information and communications technologies at the time. It should seek to build on strengths and overcome weaknesses in the current application of technology, communications infrastructures and human resources. The challenges to access to information and communication are tremendous. Distance education faces a number of difficulties such as finances, staff, equipment and time. A number of underlying problems such as resistance to distance education by educators, different learner characteristics and needs, the influence of media upon the instructional process, equity of access to interactive education delivery systems, and the new roles of teacher, facilitator and students. Already there are symptoms of lack of innovativeness in the current education system. Schools and universities have remained conservative institutions slow to adopt new practice and technology. They have remained less responsive to actual needs of the society. The education system is largely print-driven. Absorption of textbook contents tends to be the measure of educational success. Most distance learners still remain passive recipients of information rather than active participants in the learning process. Although electronic media used for dis-

tance learning such as telephones, radios, video-conferencing environments, television and computers were introduced a while ago, these have not been used effectively. While computers are becoming available in universities, these are only available in computer science classrooms and training sites; graduate students and teachers usually use them simply as electronic workbooks. Interactive, high performance uses of technology such as retrieving information from electronic libraries and performing scientific experiments in simulated environments are limited or non-existent in some distance education institutions. The Government Communication Information Services (GCIS) and the Universal Service Agency (USA) have collaborated to set up what is called Multi-Purpose Community Centres and Telecentres, mainly for rural technology development purposes. The major barrier is that in some of the areas, the infrastructure is in place and computer laboratories are installed, but learners cannot use them, because there is no electrical supply to the area and no telephone cables. These good initiatives need to be well coordinated and should involve all government stakeholders. In spite of the barriers discussed above, I think South Africa has good Information Communication Technology infrastructure and has, therefore, great potential to deliver technology-enhanced Distance Education programs now and in the near future.

## **Proposals for the Future of Technology-Enhanced DE in Your Country**

The National Higher Education Plan of 1997 is very vocal and optimistic about the use of media and technological services in distance education, as technology is seen as a driving force for social participation and economic development of all communities. Technology is seen as providing the essential multiplication factor for training resources to be utilized to their full potential. Flowing from this, a small team was charged with an investigation to develop policy proposals and a framework for technology-enhanced learning. Their first report has been published and widely distributed as a discussion document. Also the Telematics for African Development consortium funded by the World Bank and based at the Centre for Scientific and Industrial Research is running four electronic distance education projects. The Africa Growth Network uses satellite to broadcast televised education material to a network of a hundred and fifty learning centres in the country. New options for distance education are driving the shift from traditional learning communities (universities and colleges), constrained by proximity toward unrestricted lifelong learning possibilities. The shift from teacher-centered to learner-centered learning means teachers at all levels need to embrace new information and communication technologies, and teaching and learning in the distance education arena need to keep up with the advances of new technologies. As new technology is being accepted as the catalyst for new learning environments, access to communication has become crucial. The use of information technology to offer education programmes through distances is becoming an increasing necessity in South Africa. Generally there are four key areas for information and communication technologies application in education. These include Information and Communication Technology-Mediated Learning, access to information and communication via the Internet/Intranet, Education Management Information System (EMIS) and education office automation to support the education planning and management and the support of information and communication technologies to distance and lifelong learning. These tools provide ample opportunities for students to broaden their learning skills and for teachers to develop better multimedia and interactive courseware.

## **Community Organizations**

The issue of access to technology is something that distance education institutions like UNISA is addressing. UNISA is currently collaborating with community organization to provide access to technology for learners in the remote and rural areas. Communities in South Africa are generally quite well organized compared to other similar countries. This is largely due to the history of struggle in South Africa leading to the formation of trade unions, civic structures, political parties and other organizations. As indicated earlier in this assignment, the establishment of Multi-Purpose Community Centres (MPCCs) is a potential vehicle for providing access to technology for distance learners. There is national policy to support the establishment of Multi-Purpose Community Centres (MPCCs) in many communities in South Africa, and talk of using libraries, post offices, resource and advice centres, schools (and even churches) to provide computer and Internet services. The National Information Technology Forum, funded by the International Development Research Centre, is presently conducting a survey into all MPCCs in the country. There are about 25 MPCCs with functional computer laboratories in the country. If the problem of lack of electricity can be addressed, there will be more access available for distance learner closer to where they stay in the near future.

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# **CURRENT SITUATION OF HIGHER EDUCATION IN UGANDA**

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The education system in Uganda covers eight years of primary (basic) education, four years of ordinary level secondary education, two years of advanced level secondary education, and two-to-five years of tertiary education. Alternative tracks branch off from ordinary level secondary to technical colleges and primary teachers colleges. Tertiary education covers post-advanced level secondary education; this sector includes universities and other institutions of higher learning such as polytechnics.

## Number of universities in Uganda

The tertiary education sub-sector in Uganda encompasses 57 institutions licensed by government in the following categories:

- Public universities (4 in number);
- Private universities (12 in number);
- National Teachers colleges (10 in number);
- Uganda Technical colleges (5 in Number);
- Uganda Colleges of Commerce (5 in number);
- Agriculture/Animal Husbandry institutions (5 in number);
- Forestry college (1 in number);
- Cooperative colleges (2 in number);
- Hotel and Tourism Institute (1 in number);
- Medical/Health sector institutes (4 in number);
- Vocational institutes (2 in number);
- Weather/Earth institutes (2 in number);
- Management institutes (3 in number).

Added to these are nine universities and twelve non-university unlicensed tertiary institutions operating in Uganda. The National Council for Higher Education whose responsibility is to regulate higher education in the country only began operations in January 2003 and has yet to gather the required data on tertiary education in Uganda (The New Vision newspaper, Sep. 29, 2003, p. 30).

## Gross enrolment ratio

By 1995 Uganda's gross enrolment ratio at tertiary level was 2%, way below the 3.2% Sub-Saharan average. However between 1995 and 2003 tertiary enrolment increased by 230% (Balihuta, 2001). The annual average rate of increase in tertiary enrolments has been 46% per annum in the last decade (World Bank, 2000). This raised the gross enrolment ratio to an estimated 2.8%. The projected demand for higher education with improved access to secondary education is expected to reach 126,396; making up only 3.1% gross enrolment ratio (Ministry of Education and Sports web site at <http://www.education.go.ug>).

## Number of students participating in higher education

In the 1950s Uganda had a single university – Makerere University College – with enrolment of about 250 students at its peak. By the year 2000, Uganda had 29 tertiary institutions housing 55,000 students. By 2002, enrolment in 57 institutions ranged between 74,000 and 85,000.

The current total enrolment at tertiary level is estimated at between 75,000 and 85,000 people, normally aged between 15 and 25. Of these about 39% are female and 61% are male (The New Vision newspaper, Sep. 29, 2003, p. 30). Most of the growth in tertiary education in the last decade in Uganda has been in the universities sub-sector; 65% of total tertiary enrolment. The remaining 35% is shared by other tertiary institutions in the following proportions: National Teachers' Colleges 21%, Colleges of Commerce 7%, Technical Colleges 2%, Vocational Training Institutes 1%, and other tertiary institutions 4%. Between 15% and 17% of the students registered in these tertiary institutions take science-based courses; the rest are arts-based. The proposed national strategic plan for higher education envisages a plan to shift the balance to 50% science-based and 50% arts-based.



## Extent of Distance Education (DE) provision

In Uganda today, DE at tertiary level is provided by both public and private institutions. Some of the programs offered through distance education are locally sourced while others are internationally sourced. Public universities and institutes that offer DE programs of the four public universities – Makerere University, Kyambogo University, Mbarara University of Science and Technology, and Gulu University – only the first two on the list offer DE programs. Both Makerere University and Kyambogo University are dual-mode institutions. Although the Uganda Management Institute (UMI) is not ranked as a university, it is a degree-awarding higher institution of learning that also has a DE component. Nsamizi Training Institute for Social Development (NTI) is yet another public tertiary institution offering at least one program through DE.

### Makarere University

Makerere University founded in 1922, is the oldest institution of higher learning in Uganda. The distance education programme at Makerere University was started in 1967 in the Department of Extramural Studies. The Department has since been upgraded to a Center for Continuing Education and then an Institute of Adult and Continuing Education. Plans are underway to transform the Institute into an affiliate College of Lifelong Learning. From 1967 to mid-1980s Makerere University offered correspondence courses in formal and non-formal education. The formal programmes awarded preliminary and intermediate certificates in areas such as English language, mathematics, government, and economics, and a course for government clerical workers. In 1991 Makerere University introduced DE degree programs for the first time in a Ugandan university. The degree programmes offered through DE at Makerere University include Bachelor of Education, Bachelor of Commerce, and Bachelor of Science. The Department of Distance Education in the Institute of Adult and Continuing Education also services the Commonwealth Youth Secretariat Diploma in Youth Development Work accredited by the Open University of Tanzania. Makerere University also awards the DE diploma in Palliative Care offered by Hospice Africa. The University is in the process of developing two masters programs to be offered through DE – Masters in Public Health, and Masters in Education (ICT). The latter is to be supported by UNESCO. Postgraduate Diplomas in Education and in Project Planning and Management are also in advanced stages of planning. When the DE degree programs were introduced at Makerere University in 1991, the total student enrolment at Makerere University was about 7000. The number has since risen to about 30,000 about 30% of who are distance learners. Makerere University also hosts African Virtual University (AVU) Learning Centre.

### Kyambogo University

Kyambogo University was formally established in 2002 following the merger of three tertiary institutions – Institute of Teacher Education Kyambogo (ITEK), Uganda Polytechnic Kyambogo (UPK), and Uganda National Institute of Special Education (UNISE). By the time of the merger, ITEK was offering a Diploma in Education (Primary) through DE; UNISE was offering a certificate program in Special Needs Education; and UPK was hosting AVU Learning Centre. Under the auspices of the new university, efforts are underway to merge the three DE units into one. There are also plans to start new DE programs – Bachelor of Education (Primary) External, Diploma in Special Needs Education External, and Bachelor of Education (Special Needs Education) – in addition to the ongoing programmes. Through the former ITEK, Kyambogo University, supervises all National Teachers' Colleges (NTCs) and Primary Teachers' Colleges (PTCs). Through these colleges, the university supports its distance learners all over the country.

Uganda Management Institute (UMI): UMI is a public degree-awarding institution that is not a university. It is a host to the Global Distance Learning Centre (GDLC) of the World Bank. The centre mainly runs short courses and seminars for top executives and professionals using satellite technology and other computer-aided modalities. UMI is planning to extend the services of GDLC to up-country towns in the near future.

Nsamizi Training Institute for Social Development (NTI): NTI is dual-mode public tertiary institution that offers a Diploma in Adult and Community Education through DE, in addition to many other social development certificate and diploma programs. Private universities and institutes that offer DE programs of

the twelve private universities in Uganda – Uganda Martyrs University (UMU), Uganda Christian University (UCU), Bugema University, Busoga University, Ndejje University, Nkumba University, Namasagali University, Kampala University, Kigezi International School of Medicine, Aga Khan University, and Kampala International University – only UMU, UCU, IUIU and Ndejje University are known to run DE programs. Kampala International University too has mooted plans to start computer-based DE programs in the near future.

### **Uganda Martyrs University (UMU), Nkozi**

Established in 1993 by the Roman Catholic Church, the university has a DE unit that runs certificate and diploma programmes in school management and church administration. The programmes mainly target personnel working in church-founded schools and local church parishes. UMU works very closely with the diocesan education secretaries to offer both administrative and student support for the programmes. The UMU is also host to an AVU Learning Centre.

### **Uganda Christian University (UCU), Mukono**

Founded by the Anglican Church of Uganda in 1999, UCU has a DE unit that takes charge of its Theological Education by Extension (TEE) programmes. Through the TEE programmes, UCU offers certificate and diploma courses for lay Christian leaders. Plans are underway to offer a regionally collaborative Bachelor of Theology degree through DE.

### **Islamic University in Uganda (IUIU), Mbale**

Founded by the IOC in 1998, IUIU started to offer DE programmes in 2002. The university offers DE programmes at the Diploma and Bachelors levels in Education.

### **Ndejje University**

A Diocese of the Church of Uganda founded Ndejje University. It offers four DE programmes: In-service Diploma in Primary Education, In-service Diploma in Secondary Education, In-service Bachelor of Primary Education, and In-service Bachelor of Secondary Education. Demtac Consulting offers administrative and tutorial support for distance learners registered in a number of South African universities – UNISA, eDegree, Oxfordshire, etc. Demtac Consult does not provide programmes of its own.

### **International Institute of Education, Kampala**

The International Institute of Education is a private institution that offers administrative and student support to distance learners from various foreign universities, including UNISA. The International Institute of Education does not develop and run programmes of its own.

### **African Virtual University (AVU)**

The African Virtual University started as a World Bank project using an interactive instructional telecommunications network established to extend much needed science-based tertiary education to the countries of Sub-Saharan Africa. AVU uses interactive satellite- and computer-based technologies to share academic faculty, library resources, and laboratory experiences. In its pilot phase, the AVU concept was implemented and tested in 14 Anglophone and eight Francophone universities. Internationally the AVU offers degree programmes and seminars that are open to the general public for a fee. In Uganda, AVU started in 1997 with sites at Makerere University, Uganda Polytechnic Kyambogo (UPK), and Uganda Martyrs University (UMU) at Nkozi. In the operational phase, AVU was transformed from a project of the World Bank to an independent inter-governmental organization. Its head office was also moved from Washington in the USA to Nairobi in Kenya. It now has over 34 Learning Centers in 17 African countries. Although three of the AVU Learning Centers are in Uganda, not one of the three centers has been able to mount the degree programmes offered through AVU. All three Learning Centers mainly mount short courses and seminars for professionals.

The main bottleneck for AVU in Uganda has been failure to come up with policies on incorporating AVU activities into the activities of host institutions where AVU Learning Centers are based.

### **Open University of Uganda**

The Government White Paper on Education (1992) proposed the setting up of the Open University of Uganda by the year 2000. However, the government only remembered to set up a task force in November 1999. The brief of the task force was to investigate all aspects pertaining to an open university and to set out the modality for establishing one. The task force completed its work in 2000 and submitted its report to government. No known action has taken place towards the formation of the Open University of Uganda since then.

### **Ministry of Health – Health Manpower Development Center, Mbale**

HMDC in Mbale runs non-formal DE programmes for the continuing education of health workers and the general public. The center employs print and radio, dominant delivery models used for DE in Uganda. Nearly all DE programs in Uganda use print as the main delivery medium. Print is usually supplemented with face-to-face tutorials, audiotapes and telephone contacts between tutors and learners, and among learners. The use of digital information and communications technologies (ICTs) for DE in Uganda is a relatively new development. The only exceptions to the norm are AVU Learning Centers and GDLC, both founded by the World Bank. The AVU and GDLC programmes mainly rely on satellite-based and computer-mediated interaction. Print and other media are used as supplementary media. Because nearly all DE programmes in Uganda are within dual-mode institutions, the main focus when introducing ICTs in these institutions has not been directed at ICTs for enhancing DE delivery; rather the emphasis has been on ICTs for supporting face-to-face delivery. For instance, Makerere University and Kyambogo University have made evident strides in introducing ICTs in their management and teaching/learning processes but no infrastructure developed or policy formulated puts primary emphasis on DE. The proposed single-mode Open University of Uganda is the only institution of higher learning in Uganda whose policy documents and proposed structures put primary emphasis on ICTs for DE. The Open University of Uganda proposes to use radio, video-conferencing, satellite-based and computer-mediated instructional technologies as the main media of instruction.

### **Barriers or Constraints Pertaining to Technology-Enhanced Distance Education in Uganda**

For purposes of this paper, technology-enhanced DE will be taken to mean the provision of DE by use of telephone, radio, audiocassettes, television, video, computers, and associated technologies like e-mail and the Internet. In Uganda barriers to accessing these modern digital ICTs for DE purposes do exist. These constraints include poor infrastructure: Uganda has a limited telecommunications infrastructure. Presently, the ratio of telephone lines to people is 0.26 per every 100 people. Half (50%) of this access is limited to urban areas. The Rural Communications Development Plan aims at raising this ratio to 2 lines per 100 persons by the year 2003. That is when Uganda hopes to reach the current average for Africa (see Uganda Communications Commission web site: <http://www.ucc.go.ug>). Access to Internet facilities is still below one for every 100,000. Most of the telecommunications infrastructure, particularly the digital equipment, is confined to the major towns. This enhances the urban-rural divide and yet the majority population resides in rural areas. Efforts by government to bridge this gap are a commendable drop in the ocean. With the aim of setting up at least one Internet point-of-presence in 26 of the 52 administrative districts of the country by the year 2003 is met, a lot will have been done, but a lot more will have been left undone. Liberalization of the telecommunications sector in Uganda led to the introduction of other telecommunications providers, which in turn has led to having better access to telephone services, better connections as well as an increase in service penetration. The three providers of mobile telephone services – CelTel, MTN and UTL-Mango – have had a sizeable impact on the provision of both fixed and mobile telephone lines. However, the cost of access still remains a challenge, particularly for the less privileged rural communities. Liberalization has also led to an increase in the number of commercial and community radio stations. In addition to the national Radio Uganda, over 45 commercial and community radio stations now broadcast all over the country. However, the bulk of these are commercial broadcasters whose coverage does not go far beyond the capital city and the urban centers where they are based. In Uganda, access to radio may perhaps be higher than to any other technology with 130 receivers for every 1,000 inhabitants (UNESCO, 1997). Access to television services is also rated at 16 sets to every 1,000 inhabitants, this despite an increase of TV stations from

one to five. Again the majority of the TV stations are in the capital city and do not cover the whole country. Most of the above equipment depend on power supply so as to work. The electricity power supply is very limited in its national coverage. The national electricity grid covers less than 20% of the country. This means that although it is currently possible for all corners of Uganda to access e-mail via a high frequency radio service provided by a local company – Bushnet (see the Bushnet web site at <http://www.bushnet.net>) – or even via satellite, many in the rural areas would still be restricted from access by lack of electricity – even if they were able to afford ICT equipment.

## **Affordability of ICT Equipment, Accessories and Services**

The cost of equipment such as computers is high. Despite government waving taxes on all computer equipment, the cost is still prohibitive for a population whose GDP per capita is US\$320. Albeit, the tax waiver did not cover all ICT equipment and accessories except computers and their accessories. Internet services are expensive in Uganda. An Internet service subscriber often has to pay a monthly service fee and a telephone usage charge for the time they spend online. Because most of the Internet points-of-presence in Uganda use dial-up technologies, this makes the service expensive and puts it beyond the economic reach of most ordinary Ugandans. Lack of basic ICT skills Digital ICTs are a new phenomenon in the everyday life of most Ugandan. Therefore, both the tutors and the learners have low levels of skills in the use of ICTs. The use of ICTs for educational purposes requires a fair level of skills, yet these are generally lacking in most of the learners and tutors. Technologically enhanced learning systems require a sizeable pool of to maintain the systems in a running condition. These skills too are in short supply in the Ugandan context. National policy barriers Implementing ICTs poses significant challenges. In Uganda, like it probably is in many developing countries, there are debates as to whether to spend the meager financial resources on ICTs or on poverty and her sister ills – basic ignorance and disease. However, government policy seems to vaguely recognize the opportunities presented by ICTs in the wider context of providing information for societal development. A number of policies in Uganda are relevant to ICTs for open and distance learning. The government White Paper on Education (1992) contains a number of policies related to distance learning. In support of the need for continuing and lifelong education, the government adopted the position that:

- government, with the support of the private sector, should assume full responsibility for the development of continuing or further education in Uganda;
- tertiary institutions, especially universities, should expand the activities of their centers for continuing education and extension work;
- an open school and an open university should be established in due course to provide continuing education at the secondary and tertiary levels;
- community centres should be rehabilitated and transformed into cultural development centres and centres for youth and adult education programmes, government also agreed that the needs of Ugandans to receive education, especially in the remote rural areas, must be adequately served and that all forms of the mass media (radio, rural and national press, television, and mobile film and video units) should be mobilized for this purpose. Radio, television, and video were considered to be particularly useful tools.

### **Recommendations accepted for open and distance learning and the mass media include:**

- Distance education through radio, television, and correspondence courses should be strengthened. For this purpose the Ministry of Information and Broadcasting should set up separate radio and television channels for educational purposes.
- Rural presses should be set up in all the five major languages of the country. In an attempt to put some of these policy positions in practice, the government put in place a task force for the formation of the Open University of Uganda (as earlier discussed). The rest of the policies are to be developed and implemented by various line ministries.

## **Telecommunications policy**

The national telecommunications policy primarily calls for liberalization of the telecommunications sector. While there are no specific references to DE in this policy, its benefits are a boost to the objectives of DE. These benefits include increasing the number of radio stations and liberalizing the telecommunications sector (as earlier discussed). However, although this policy brought about an increase in radio and TV stations, and in telephone coverage of the country, the cost has remained quite high, despite the competition. It is hoped that

the competition among providers will eventually force costs down. The fact that business interests are leading the way in a society where more than 30% of the population lives below the poverty line dictates that government comes in to push the threshold higher.

Proposed national ICT policy Uganda does not yet have a national ICT policy; it is currently being discussed. It is hoped that the policy will not give priority consideration to other users of ICTs only and remain silent on the stakes DE holds in ICT. With regard to policy, it needs to be stated that the slow pace with which the government has tried to implement its stated policies on DE, and the manner in which some key government policy documents have remained silent about DE speak volumes about the low priority position given to DE in the national policy framework. The president himself is on record as having said that while other people are floating ideas like distance education the way forward, to him the primary focus of the social revolution in Uganda is on basic education. No wonder DE lacks adequate political support. And this is a key barrier in formulation of policies and in the sharing of scarce national resources that affect DE provision in Uganda. This attitude may emanate from the small budget the government has to run on; and more than 50% of it is donor-funded.

**Social and cultural barriers:** Computers and other ICTs are very intimidating to a learner or tutor who first meets them when an adult. Fear of technology and fear of failure may come in between the learner and the intended learning experience. Additionally, the general low levels of literacy may affect the use of ICTs for DE. This situation is particularly aggravated by the fact that the bulk of the information conveyed through ICT is developed in a foreign cultural environment and in a foreign language. Rural people generally reject technology that tends to “spoil” the learners by introducing them to cultures that are viewed as “immoral”. Poverty is another social factor that cannot be overemphasized. If ICT-enhanced DE is not seen by the community to address its poverty situation, the technology will be viewed as irrelevant. In addition, social attitudes toward those who study using ICT-enhanced DE, do affect participation. Poverty also creates insecurity around the ICT study centres, since poverty breeds criminals, and criminals know the financial value of ICT equipment. Installing ICT equipment in poverty-stricken localities, therefore, entails more costs on safeguarding the equipment.

## **Proposals for the Future of Technology–Enhanced Distance Education in Uganda**

The future of technology-enhanced DE education in Uganda will be dictated by what we do now to address the constraints identified above.

### ***How to deal with poor infrastructure***

Although infrastructure development is very expensive, it is imperative that resources be found to address this need. Development of communication infrastructure is the business of governments – whether by direct investment or by designing policies to promote private investment in this sector. The putting in place of certain policies has yielded definite results in the case of Uganda. It is now up to the DE practitioners in the country to demand that DE-friendly decisions be given a priority consideration in future policy formulations and allocation of resources for ICT infrastructure development. While favourable infrastructure and policies are being worked on, it is important that current DE providers take advantage of the current infrastructure available to develop and offer ICT-enhanced DE programmes. This will ensure skills development and possibly enhance the enrolment, since students who may not study by the currently dominant media may be drawn into the net.

Involvement with ICT-enhanced DE has the additional advantage of both learners and tutors experimenting with the existing ICTs and making a contribution to the debate on the pedagogical value of ICTs in various learning environments. In the process Africa may show the way to develop affordable pedagogical technologies for DE. The ICT-enhanced DE programmes should be offered alongside the currently dominant media so as to ensure continuity. This may appear wasteful in the short run, but it is the sure way to address the technology gap without being bogged down altogether by lack of infrastructure.

Uganda also needs to make the most of global efforts that are in place to try to bring about greater connectivity. Such initiatives include the World Bank-sponsored SchoolNet project, the Acasia Initiative, and USAID-supported Leland Initiative. If our policy-makers and governors understood the value of ICT-enhanced DE, perhaps they would put more into these global efforts and also expect more out of them. Handling issues of affordability of ICT equipment and accessories granted, most ICT equipment is externally



sourced, so the cost is also not locally determined. However, government taxation policies and liberalization have already had a visible impact on the ICT sector in Uganda. What is now required is to find out what the policies do not adequately cover, especially with a view to enhancing the use of ICTs in DE. While access to ICTs remains beyond the means of many individual Ugandans, there are a number of local and international initiatives that attempt to improve access to ICTs. These include the multipurpose community telecentres and the SchoolNet project. There are bottlenecks in sustaining these donor-initiated projects. But this can be tackled by involving stakeholders right from the planning stage, so that they own the projects and design sustainability plans. The government should also come in to develop and sustain ICT infrastructure and equipment, especially in disadvantaged rural communities. These should be designed to serve as community resource centres as well as study centres right from the beginning if we are to avoid looking at DE as an intruder at these community centres. Institutions of higher learning in the country and the region should form consortia through which they can share the costs of expensive ICT infrastructure and the development of local study materials to be used on the networks.

Dealing with the lack of skills in ICT for DE demystification of ICTs should be part of the entire education system. This would put all potential distance learners and tutors at ease with ICT-enhanced learning environments. Given that ICTs can be deployed to greatly enhance access to DE, it is essential that DE tutors and learners become aware of the potential benefits of ICTs in DE provision. There is need to increase their confidence in their ability to use ICTs through sensitization seminars, workshops and short courses for trainers-of-trainers. Since this is technology-assisted learning, there is need to train a critical mass of technicians who keep the systems in running conditions. With ICTs evolving at such fast rates, training and retraining should be permanent features of any DE programme.

Dealing with social and cultural barriers as outlined earlier, social and cultural barriers to the use of ICT-enhanced DE include fear of ICTs, fear of foreign cultural influences and social problems related to poverty. Fear is an attitude of the mind. It can, therefore, be dealt with through counseling and other confidence-building measures. When DE tutors and learners are made to appreciate the value of ICTs in their studies and life, they are likely to develop sufficient motivation to overcome their phobias. Fear of foreign influences can be addressed by developing local materials that address local situations in a culture-conscious and socially relevant manner, possibly in the language accessible to the learner. There is no shortcut to addressing poverty-related constraints. The introduction of ICT-enhanced DE must be seen to relate to the fight against this seven-headed monster if it is to be appreciated by the community. Computer skills gained for and by studying through ICT-enhanced DE become useful in any modern working environment just like literacy gained through the school system so as to succeed in, it ends up being useful throughout life.

## Conclusion

Although higher education in Uganda has been expanding rapidly in the last decade, the gross enrolment ratio is still very low when compared with the world average. The provision of DE programmes in higher institutions of learning is also quite widespread and developing quite rapidly. However, the use of ICTs in DE and in education has been quite minimal, and this has helped perpetuate the digital divide between the information-driven developed world and the underdeveloped world. If Uganda is to survive and compete in this digital information era and to improve on its gross enrolment ratio at tertiary level, there is need to explore the path of ICT-enhanced DE. This paper points out the constraints along the way and points out the possible way out.

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**TECHNOLOGY-ENHANCED DISTANCE EDUCATION:  
A BOTSWANA PERSPECTIVE**

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## The Current Situation

Distance Education (DE) in Botswana started way back in the 1970s. Then, DE was offered by government through the Botswana Extension College. This college was later absorbed by the Department of Non-formal Education and was named Distance Education Division (DED). The sole mandate of DED was to develop and administer courses through DE mode. DED focussed only on courses at secondary education level (both Junior Certificate and then the Cambridge O' level Certificate).

In 1993, the Botswana Government instituted a commission to look into the whole education system. One of the recommendations of that commission was that there was need to establish an autonomous body to focus on DE. They observed that due to the high dropout at both junior and senior secondary schools, there was need to beef up DED to cope with the enrolment figures. Another reason supporting the establishment of such an institution was to enable it to develop strategies for recruiting and retaining learners most of whom were unable to study by distance (Botswana Government, 1993).

After studying the recommendations of the commission, the government issued the Revised National Policy on Education in 1994. In this policy, the government accepted the recommendation of establishing a DE institution. This was the birth of the Botswana College of Distance and Open Learning (BOCODOL). Like DED, BOCODOL was to continue offering secondary school courses. But its mandate was broadened to cater even for Higher Education (HE) courses. At the moment, BOCODOL has not started offering HE courses.

It is worth noting that until the establishment of BOCODOL, DED was the sole provider of DE in Botswana and was only focusing on secondary level courses. So, what was the situation like at post – secondary level. Sadly, until 2000 there was no single provider of DE at tertiary level. The Centre for Continuing Education (CCE) of the University of Botswana (UB) has been in existence for quite some time. But it started offering the first ever DE course in 2001. The Diploma in Primary Education (DPE) course is aimed at upgrading primary school teachers with Primary Teacher Certificate (PTC) to a diploma level. The centre (CCE) has embarked on a mammoth task of trying to improve DE provision in the country and has managed to introduce Degree courses in 2003. A commendable effort, indeed.

To put things into perspective, we need to look closely at the two and only official providers of DE in Botswana. BOCODOL has an up-hill kind of task. According to Central Statistics Office (2003), only 40% of students enrolled in secondary schools are able to progress and complete the Botswana General Certificate in Secondary Education (BGCSE). This figure does not say anything about those who fail BGCSE. What this means is that all the 60% that does not make it to BGCSE, plus those who fail BGCSE, have to be catered for by BOCODOL. Of course there is a small percentage that are readmitted by private secondary schools. This is a minute percentage since most parents do not afford the fees charged by private schools. For example, of the total school enrolment of 151,847 in 2001, only 6,607 were in private schools (Botswana Government, 2003). This gives a meagre 4.35%. So, BOCODOL has to cater for the rest. A big and difficult task, indeed.

Looking specifically at HE, it is regrettable that currently, there is only one university in the country. This creates yet another bottleneck in the education system. Out of the 38, 490 students who completed BGCSE in 2001, only 4,467 (11.6%) were absorbed by UB (Botswana Government, 2003). While I acknowledge that some would be admitted into colleges and others sent outside the country, it is still not enough, given the capacity of most local colleges. This scenario calls for UB to strengthen its DE provision. As the only university in the country, and currently the only DE provider of higher education, CCE has to find ways of reaching out the scores of youth who cannot make in the conventional face-to-face mode. Using the 2001 enrolment figures for DPE, we find that out of the total UB population of 12, 286 only 600 (4.88%) were involved in DE. This is a course for concern.

Coming to the DE mode itself, the two providers use print media as a dominant teaching and/or learning mode of delivery. They also use audio to either supplement print or minimally integrated with print. The use of radio in both institutions is minimal. Of late, UB has introduced video-conferencing as a teaching /learning mode. Otherwise none of the two providers have gone into e-learning.

## Barriers Pertaining to Technology-Enhanced DE

Generally, one can attribute the almost non-existent use of ICTs in DE to the fact that ICTs is a new phenomenon in developing countries like Botswana. Hence, it would be difficult to argue with certainty that indeed there are barriers to their use. The only sure and evident barrier is that of access. Reasons for lack of access to digital ICTs and technology-enhanced DE can be political, social, cultural and, more importantly, economic.

Most Botswana do not have access to computers, both at work and at home. Mostly, people cite economic reasons for this state of affairs. Political and cultural constraints also worsen the situation. In this particular case, political constraints are confined to the infrastructure development. Botswana is a vast country with near to poor telecommunications network. Most villages do not have even a telephone. This situation is likely to improve in the next few years. The government is trying everything possible to electrify most villages as well as improve telecommunications network (Botswana Government, 2003).

Another barrier to the use of digital ICTs is that Botswana are generally illiterate. It goes without saying that only literate people would know about digital ICTs, let alone use them. As for using them in DE, it is of course, that small segment of the population that is able to access them. Otherwise there is not much that can be said about technology-enhanced DE in Botswana at the moment.

## Proposals for the Future of Technology-Enhanced DE in Botswana

Before we can talk of the future of technology-enhanced DE, it is appropriate to start with access to DE. Looking at the current situation in Botswana, I am tempted to argue that the first step should be making sure that we reach as many people as we possibly can using particularly print-dominated DE mode. As noted earlier, most of the villages in Botswana still have very poor communication networks to enable us to go into technology-enhanced DE immediately.

But technology-enhanced DE may be the answer to reaching out the masses! With this view, one can look at what the future of technology-enhanced DE should be. My first proposal would be the future of DE in Botswana, particularly for higher education. It is fairly obvious that BOCODOL and CCE should join hands in providing DE. One of the most feasible ventures can be merging the two institutions so that they can use their limited resources optimally. If each of the two institutions goes solo, the likelihood is that very soon they will start competing for the clients rather than servicing them. This will come especially when BOCODOL starts offering high education courses. It is my believe that with the limited pool of especially human resources, it will be difficult for each institution to develop and effectively support DE programmes.

Coming back to technology-enhanced DE, it is encouraging to state that there is a deliberate move by the government to improve telecommunications network in the country. For example, there is what is called the Rural Electrification Project run by the Botswana Power Corporation, which aims at connecting electricity to most villages throughout the country. Coupled with that is the Rural Telecommunications Programme. Through this project the Botswana Telecommunications Corporation intends to provide telecommunications network throughout the country. Yet another initiative is through the Botswana Technology Centre, through its Community User Information Services. This is a particularly important step because it focuses on providing e-mail and Internet services to the communities. It is still at pilot stage though. If all these projects were to achieve their goals, then that would be a good start for this country to embark on technology-enhanced DE.

Another positive development by government is the proposed Shared Use of Resources Policy. Through this policy, there will be a deliberate effort to ensure that government and parastatal organizations share their resources. Now, there is also the School Computerisation Project, which aims at ensuring that each secondary school has computers. Once the computers are installed, there will be a Computer Awareness course taught in schools. This project has already gained ground. It has been piloted and is now at implementation stage. The intention is to roll out this project to primary schools, with time and resources permitting.

Why are all these projects of any use to DE? Well, tying all the loose ends, I can make a proposal that the DE providers in Botswana should take this opportunity to be pro-active. BOCODOL has already benefited from the Shared Use of Resources policy by using schools as study centres. The same applies to CCE because it uses colleges of education as study centres, particularly for the DPE programme. What remains is for the two institutions to take schools head on and start a rigorous campaign for the shared use of Resources Policy to be put in place. But like I have said earlier, it would be more meaningful for the two institutions to work together on this task rather than each one of them negotiating on its own.

Other than schools, there are Education Centres spread throughout the country, which have computers. Even where there are no computers, the DE providers can and should provide computers in the centres. In a nutshell, there is need for the DE providers to ensure that there are computers and other digital ICTs like video machines within the communities. These communities can then share whatever services are provided. This is a medium to long-term strategy which needs to be prepared for now. All that is required is for DE providers to be pro-active.

While the shared use of resources is a feasible medium to short-term strategy, I propose that BOCODOL and CCE should start piloting online courses now. With the computers that the two institutions have, there is no how it is impossible for them to start at least piloting online courses. BOCODOL has regional centres which are equipped with computers. Arrangements can (and should) be made to use those computers optimally by allowing learners (even those of CCE) to have access to them. I am convinced that if BOCODOL and CCE were to merge or at least establish a formal agreement to work together, they can take advantage of the government initiatives to open more spaces for not only DE by technology-enhanced DE. Other forms of ICTs would be tried with time. The starting point should be computer-based DE courses, since there is already a possibility of improving access to computers countrywide.

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# **HIGHER DISTANCE EDUCATION IN NAMIBIA: STATE-OF-THE-ART**

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The purpose of this chapter is to give an overview of Higher Distance Education (HDE) provision in Namibia and to highlight some achievements and constraints in this sector. Initially, the legal status of current situation of Distance Education (DE) in Namibia is given, incorporating institutions offering DE, enrolment figures and delivery modes of Open and Distance Learning (ODL) in pre-tertiary (i.e. secondary) and Higher Distance Education, respectively. Constraints in the usage and development of information and communication technologies (ICT)-enhanced distance education are described and suggestions for improvement are made.

## The Historical Context

To understand the context of higher distance education provision in Namibia today, it is vital to situate its development in the country's broader "geopolitical and socio-economic context" (Möwes & Siaciwena, 2000, p. 5). Namibia is a large country with a very unevenly distributed population per square kilometers. With an area of 824,269 square kilometers, and a low but widely scattered population of over 1.8 million resulting in a low population density, it is certainly challenging to effect the provision of related infrastructure (e.g. electricity and telephone lines) (Kazapua & Odada, 2001).

As reported in several studies (Dodds, 1996, Möwes & Siaciwena, 2000 and Kazapua & Odada, 2001), nearly half (i.e. 45%) of Namibia's population live in the north-central, 15–20% live in Windhoek – the capital city and areas close to it. The rest of the population is scattered over the rest of the country. Coupled with challenges related to infrastructure, the dispersed settlement patterns in distant rural areas raise the cost of providing quality education with the two ministries of education spending between 25–30% of the national budget on education. In spite of the inequities associated with educational provision that were inherited from the then apartheid system of government of the Republic of South Africa, Namibia has attained nearly 80% basic literacy 12 years after independence.

It is noteworthy to mention that significant improvements in telecommunications infrastructure connecting the local communities to the main capital have been attained. With funding, this makes it easier to provide ICT equipment such as computers and connectivity in schools and other educational institutions countrywide.

## The Legal Status of DE in Namibia

The then Ministry of Higher Education, Vocational Training, Science and Technology (MEVTST), now called Ministry of Higher Education and Employment Creation was formed in 1995 to guide the development of higher education, stimulate vocational training as a vehicle for socio-economic development and enhance science and technology for community empowerment, wealth creation and poverty reduction (MEVTST, 1999). Specifically, higher education includes all post-basic education comprising the vocational training centres, four colleges of education, the Polytechnic of Namibia, the agricultural colleges, and the University of Namibia. These are the key institutions, which make up publicly funded higher educational institution. The higher education sector actively contributes toward human resources development for Namibia and more generally to national development, given the critical role played by these institutions in developing the necessary skills and expertise that are critical to foster sustainable development for Namibia.

The provision of open and distance education in Namibia (ODL) is rendered at various levels ranging from adult literacy programmes through pre-tertiary education to tertiary education. The major publicly funded providers of this form of education include the Namibia College of Open Learning (NAMCOL), the National Institute for Educational Development (NIED), the Polytechnic of Namibia (PoN) through its Center for Open and Lifelong Learning and the University of Namibia's Center for External Studies (CES). The Namibian Broadcasting Corporation (NBC) plays a vital role in the provision of educational services.

Apart from these institutions, there is growing number of local private and foreign providers of distance education. Though this is beyond the scope of this chapter, they are worth mentioning. Given the proximity of Namibia to South Africa, the majority of these institutions are largely South African (public/private), including the University of South Africa (UNISA), which is represented by a private company in Namibia called "Open Learning Group" (Kazapua & Odada, 2001), Vista University, Technikon RSA and Technisa (Vivier, 2000). Others comprise Rand Afrikaans University (RAU), and the Damelin Education Group. The Institute of Higher Education (IHE) – a Namibian born organization which offers professionally tailored courses through

a mixed mode leading to qualifications awarded by European based institutions and/or universities such as Association of Business Executives (ABE) (UK), University of London (UK) and Cyprus Institute of Marketing (CIM) (Cyprus), etc. (Kazapua & Odada, 2001).

In the following section, the overview of the four publicly funded DE institutions is given.

## 1. The Namibia College of Open Learning (NAMCOL)

### Mission and Programs

NAMCOL is a semi-state supported educational institution, which was established by an act of Parliament in 1997 to cater for pre-tertiary, i.e., secondary education (grades 10-12) to mostly out-of-school youth and young adults. Two programmes are offered in this regard leading to certification at two levels:

- The Junior Secondary Certificate (JSC) for Grade 10 learners, which is the nationally set and marked examination, and
- The International General Certificate of Secondary Education (IGCSE) for grade 12 learners, which is an externally accredited, school leaving examination.

Besides secondary education, NAMCOL offers a certificate in Education and Development which was introduced in 1997 in conjugation with one of its partners, UNISA ABETA Institute intended to meet staff development needs of adult educators, e.g. district literacy organizers, agricultural and health extension, etc.

### Enrolment

NAMCOL has helped more than 160,000 students achieve educational objectives that would otherwise be beyond their reach since its inception. In doing so, NAMCOL has become the single largest pre-tertiary open and distance learning institution in Namibia with more than 26,000 learners currently enrolled, which amount to more than the combined number of students at all other higher educational institutions. NAMCOL's stakeholders range from learners who need to bridge the gap between formal secondary education system and tertiary institutions, to adults seeking to expand their horizons from basic literacy to advanced courses in specialized fields (Annual report, 2002).

### Mode of Delivery

NAMCOL had, until recently (2003), employed a dual mode of delivery combining *face-to-face* evening classes and distance education with face-to-face outstripping that in the distance education mode (NAMCOL, 2001). Currently, a new mode of delivery, which combines face-to-face classes with the use of materials in an open learning approach, is in use. The open learning approach is perceived as an improved system for independent learning. Printed materials are complimented with additional audiocassettes in the case of languages. NAMCOL further makes use of the Namibian Broadcasting Cooperation to broadcast some of its educational programmes through the radio for learners.

### Student Support Services

All students that are enrolled under the OPEN mode, are getting the following support services:

- limited face-to-face sessions with ODL programmes,
- quality developed and printed materials,
- vacation workshops, and
- one mock examination before the final exam is administered to prepare learners.

## Distance Learning Technologies

Distance learning technologies, which are employed in course delivery, include:

- audiocassettes,
- radio broadcast through the Namibian Broadcasting Cooperation.

## Future Plans Regarding ICT Use

- training of online tutors/moderators,
- development of online course delivery material for some of the subjects, e.g. math and science,
- establishment of a full radio broadcast station to deliver ODL courses for NAMCOL and other ODL institutions.

## 2. The National Institute for Educational Development (NIED)

### Mission and Programmes

NIED was established in 1991 to spearhead the reform of the formal educational system through innovative *curriculum and materials research and professional development* through *pre-service and in-service education* of teachers and to conduct educational research. The Institution is a line directorate of the Ministry of Basic Education, Culture and Sport. With the introduction of the Basic Education Teacher's Diploma (BETD) as the standard qualification for teachers in Namibia, the four existing Colleges of Education were assigned responsibility for offering this programme for pre-service teacher candidates. To support continuing teacher professional development, the National Institute for Educational Development (NIED) offers *the BETD In-service Teacher Diploma for unqualified and underqualified teachers* (a four-year diploma) through a single mode distance education system.

### Mode of Delivery

As part of its continuing professional development functions, NIED offers the BETD In-service Teacher Diploma through *a single mode distance education combining* two main approaches:

- print textual media remains the dominant technology in use using module guides, activity booklets, support materials, tutorial letters, assignments and End-of-Module tasks, and
- a limited five days face-to-face contact session which occurs three times per academic year in the first week of each school holiday.

### Enrolment

Since its inception, NIED has graduated a total of nearly 1,941 teachers by the end of 2003. During 2003/4 academic year almost 2,181 Inset Teachers were enrolled in this program.

### Student Support Services

Tuition takes place at six in-service units, which serve as study centres located countrywide in the regions. These include the two colleges of education, Windhoek College and Ongwediva College and Teachers' Resource Centers (TRCs) such as Keetmanshoop TRC, Rundu TRC, Katima Mulilo TRC and Khorixas TRC. Student support services are highly decentralized. Besides the *face-to-face sessions*, they include:

- tutoring through assignments,
- student self-study groups (SSG),
- TRCs and/or in-service units, and
- PC labs networked to the internet with own server within each TRCs and/or inset unit where students access course information and a variety of web resources to enrich their personal and professional development.

The TRC centers and/or inset units serve multiple roles, including *administrative functions, collect tuitions, and render Internet access to students*. These facilities raise student motivation and reduce student attrition to an absolute minimum. NIED uses a team approach to produce study materials, prints the material, and does distribution to the TRC/Inset Units.

It is also noteworthy to mention that the BETD In-service programme is financially a self-sustaining programme as student tuition fees help to defray all financial aspects of the programme, for instance the production and printing of module guides, payment of tutors and markers, postal services, and the training of tutors, etc. The Ministry of Basic Education, Sport and Culture only pays the salary of the Education Officer in charge of the BETD In-service Programme, which forms part of in-service teacher education.

### **Current Efforts on ICT Integration in DE and the Use of Learning Technologies**

Due to a shortage of particular ICT resources and technical expertise in certain areas, plans are underway to integrate modern-day ICT tools as part of instructional tools in DE. To date, the use of ICT in NIED's continuing professional development amounts only to:

- Training of teacher educators and education officers through online professional development programmes in ICT integration into education through Harvard, Graduate School of Education to prepare online course tutors/moderators/couches;
- Developing local content for online learning for different courses as part of continuing professional development currently being carried by iNET;
- Use of e-mail to encourage two-way communication with the study centre managers and tutors located elsewhere in the regions;
- Use of the Internet to issue course information, e.g. curriculum, course descriptions and outlines, programme requirements and deadlines through NIED web site.

### **Future Plans Regarding ICT Use**

- Training and retraining of teacher educators and education officers through online professional development programmes to prepare online course tutors/moderators/couches;
- Development of online course delivery and learning platforms;
- Cross-cultural cooperation with other universities involved in DE and ICT, e.g. William Peterson based in New Jersey, USA.

## **3. The Polytechnic of Namibia (PoN)'s Centre for Open and Lifelong Learning (COLL)**

### **Mission and Programmes**

This institution also has its roots in the former Academy for Tertiary Education. In 1994, the PoN was established with the promulgation of an Act of Parliament. One of its key aims is the provision of continuing education at post-secondary level, including the establishment of a separate Distance Education Centre (DEC). In January 2000 the name DEC was changed, and replaced by the new name, Centre for Open and Lifelong Learning (Keyter, 2001) because it was seen as narrowing in its scope. The mission of COLL is to make education more accessible to Namibians through the provision of programmes designed purposefully through principles of open and distance learning. To this end, the following programmes are offered:

- National Certificate Public Administration;
- National Certificate Police Science;
- National Higher Certificate Public Administration;
- National Higher Certificate Police Science;
- National Diploma in Public Administration;
- National Diploma in Police Science.

The following programmes are offered in collaboration with Technikon South Africa:

- B. Tech (Nature Conservation);
- B. Tech (Agricultural Management).

## Enrolment

In 2003 academic year, as reflected in the annual report, 848 students were registered for part-time studies only, while 1667 full-time and part-time students enrolled for two courses on average through open and distance learning.

## Mode of Delivery

The main *mode of delivery* constitutes *printed course materials* of a high quality. As stated in the Annual Report (2003), while print remains the main delivery mode for most courses, it is envisaged that emphasis will shift to the use of *interactive web-based learning*.

## Student Support Services

Improvement in student support services is evident. Assignments coming from students are used as a teaching tool and tutor markers, therefore do not just mark in a conventional sense, but also give the necessary advice and encouragement on how to improve their work. *Telephone tutoring* at specified times is also used to strengthen student support. *Face-to-face tutorials and vacation schools* are offered to enable students to meet tutors, and make use of library facilities as well.

PoN uses the same regional offices as UNAM as study centres, to be cost-effective, and for students to get the administrative and academic support needed. Nine such offices exist through UNAM's regional centres. As it is the case for the Center for External Studies, the Center for Open and Lifelong Learning at the Polytechnic of Namibia also places emphasis on student decentralized support services. Worth mentioning here are *training seminars for tutors to strengthen their individual capabilities in tutoring distance education students, the moderation of tutor-marked assignments guided by criteria based on open and distance learning principles, and the orientation seminar for new students during the initial vacation school* to help them identify and exploit sources of support services that are available to them as remote or isolated students (COLL Annual Report, 2003).

## Distance Learning Technologies

Distance learning technologies, which are employed in administering courses (and not course delivery) include:

- use of e-mail to encourage two-way communication and submit assignments;
- use of the Internet to issue and obtain examination results, make and receive important announcements, e.g. examination timetables and vacation schools.

## Future Plans Regarding ICT Use

- training of online tutors/moderators;
- development of online course delivery for some of the courses;
- use of computer conferencing.

# 4. The University of Namibia (UNAM)'s Center for External Studies (CES)

## Mission and Programmes

The University of Namibia was established by an act of parliament in 1992, followed by a proposal to establish a Center for Adult and Continuing Education and Distance Teaching. At present UNAM is the only national university and offers its programmes through *the dual mode*. In 1993, the Center for External Studies (CES) was

established out of a combination of the Department of Distance Teaching and the Center for Adult Education. The CES grew out of a department of distance teaching of the pre-independence Academy (combining a University, Technikon and a College of-Out-of-School Training). It administered, with little quality control, a traditional single and mode correspondence education programme with cheaply didactic print courses and virtually no student support system.

As the centre for distance and open learning of the University of Namibia, during the first five-year plan, CES committed itself to continue and expand its distance education services, to include the formerly disadvantaged communities, who were already employed. So, it became one of the CES's key goals and responsibilities to reach out to those people in the former "homelands" to assist them in the furtherance of their education (Möwes and Saichiwena, 1999). The *mission* of the CES is, thus, to make quality higher education accessible to adult members of the community by the provision of open learning through distance and continuing educational programs. Initially, most of the programs were geared to suit the needs of teachers, which gradually phased out, because they became inappropriate for an independent Namibia. Today CES offers various diplomas and degrees *programmes covering:*

- nursing,
- african languages,
- education,
- library science, and
- business administration.

## Enrolment

The number of students enrolled in the DE mode for 2002 was 3,658, inclusive of the regional centres. It has escalated to 4,310 in 2003. This is the latest figure, including new intake in August 2003.

## Mode of Delivery

CES mainly taught through conventional *face-to-face* on-campus approach. Although this mode of delivery remains the centre of tuition, efforts have been made to incorporate other delivery models complemented by print. Currently, *printed materials and face-to-face sessions* are the main mode of instructional delivery. Further, some of these materials are being made to include *audio materials* as well. Vacation schools in the form of face-to-face tutorials or by means of interactive video-conferencing are organized at various centres from time to time (Möwes & Siaciwena, 2000). Added to the list is *video-conferencing and tele-conferencing by satellite*. *This mode of delivery is very expensive, but has proven to be effective (Lewin, Oct. 2003).*

## Student Support Services

Considering the difficult conditions, which the majority of students face, decentralized student support system is widespread through the establishment of regional centers, *tutoring through assignments (marker tutoring), telephone tutoring and face-to-face tutorials*. Almost all of the study centres offer Internet and computing services to students and members of the public.

## Distance Learning Technologies

Distance learning technologies, which are employed in course delivery, include:

- tele-conferencing,
- video-conferencing,
- video,
- audiocassettes.

## Future Plans Regarding ICT Use

- training of online tutors/moderators;
- development of online course delivery for some of the courses;
- put tutorials online (website) for students;
- develop interactive CDs to support certain courses, e.g. math and science.



## Quantity of the Staff Working at Higher Education Institutions in the Country

Total <sup>1</sup>	Among them at higher education institutions working upon DE forms						
	Teachers <sup>2</sup>		Tutors		Auxiliary staff		Other (Administrative)
	Total	Those using ICT	Total	Those using ICT	Total	Those using ICT	
1,639			1,313	150	12	6	158

Source: NAMCOL Statistical Digest, 2002; COLL & CES, 2003 and NIED–BETD Inset Staffing Statistics, 2003/4).

## Quantity of Students in Higher Education Institutions in the Country

Total (All four publicly funded ODL institutions (i.e. CES, COLL, NAMCOL & NIED) included)	Among them studying upon DE forms			
	Single mode <sup>3</sup>	Dual mode <sup>4</sup>	Mix mode	Other <sup>5</sup>
28,487	2,181	24,639		1667

Source: Polytechnic–COLL, 2003 Annual Report; NAMCOL Statistical Digest, 2002; NIED, 2003 Enrolment Statistics and UNAM–CES 2003 Enrolment statistics.

## Constraints Facing DE Institution in ICT Integration in DE

1. Until the establishment of the Namibia Open Learning Network (NOLNet<sup>6</sup>) recently, all ODL institutions were, to a large extent, operating in isolation with little collaboration among them. This implies that there has been duplication of resources. Through NOLNet, ODL institutions today are able to share and as a result avoid duplication of resources by establishing smart partnerships ensuring the exchange of expertise in a number of areas, including:

- preparation of tutors and module writers in DE;
- provision of ICT equipment in study centres scattered countrywide;
- use of learning centres;
- library resources;
- student support services.

<sup>1</sup> Includes all four publicly funded ODL institutions (i.e. CES, COLL, and NAMCOL & NIED).

<sup>2</sup> This concept is ambiguous - the preferred term in DE in our context is “tutors”.

<sup>3</sup> Applies to the BETD Inset Program - NIED (2003 Enrolment Statistics).

<sup>4</sup> Includes NAMCOL enrolment statistics during 2003 (NAMCOL Statistical Digest, 2002), UNAM-CES 2003 Enrolment statistics, and COLL enrolment in Distance Education (2003 Annual Report).

<sup>5</sup> Includes part-time and full-time Studies (Polytechnic-COLL, 2003).

<sup>6</sup> The Namibia Open Learning Network (NOLNet). Essentially, NOLNet was formed in July 2001 to construct conditions and structures for the partner institutions to communicate with one another about their activities and plans in relation to ODL; coordinate the development of new courses and facilities to avoid duplication, and cooperate in planning and carrying out joint activities...(<http://www.nied.edu.na/projects/NOLNet.htm>).

2. Lack of National Policy and/or standards to guide DE and ICT. Even though a draft policy for ICT for Education is currently being developed to guide the provision and use of ICT across the education sector, there are no national guidelines in the form of standards that could guide among others, DE provision and the use of ICT, student support services, assessment, tutoring and courseware development, etc. Consequently, institutions involved in DE are using internal guidelines that were either developed internally or elsewhere resulting in lack of consistency.

3. Lack of sufficiently specialized trained manpower both technically and educationally to produce material for web-based learning, development online management systems or learning platforms to support online professional development content and prepare coaches involved in DE. With the two participants who have completed a training course in HDE and ICT sponsored by UNESCO IITE, it is hoped that more practitioners in DE will be trained to strengthen the capacity base.

4. Limited financial means to constantly maintain and upgrade existing ICT tools as well as the training and retraining of practitioners in DE to keep up with the ever changing nature of ICT locally and internationally.

## Other Challenges

Namibia shares similar constraints as with other countries in Sub-Saharan Africa regarding the infusion of ICT in DE. From the foregoing discussions, it is clear that amongst others Namibia lacks sufficiently trained IT experts as in some cases it had to seek support from elsewhere to develop capacity locally. Insufficient development of educators and teachers, high costs of ICT equipment, software and training as well as monopoly of telecommunications associated with excessively restrictive rules and high costs by Telecom Namibia – the only state owned company licensed to offer provide infrastructure (Knowledge, Information and Technology, 2002).

## Conclusion

From the foregoing discussion, it is clear that, the state of ICT and DE provision in Namibia is very impressive. DE in Namibia currently seems to be well organized in four publicly funded institutions with minimum level of coordination through NOLNets to share strategies and coordinate the delivery of distance education in the areas of student support, programme development and the incorporation of ICT in delivering tuition, though with minimum fragmentation. The advantage of this scenario is that each institution will define its programmes according to its own priorities and tailor its activities to the specific students it seeks to serve (MHEVST, 1999). At the same time, the downside is this approach will likely produce overlapping and duplication of courses and facilities. It is also likely to have high development costs both in absolute and per-student terms and, probably, lower quality and, perhaps, narrow course offerings.

We recommend that priority must be given to the development, implementation, and monitoring of a comprehensive DE and ICT policy for education for Namibia. After the successful implementation of the policy, which must have the support of all sections of the population, including the industries and the government<sup>7</sup>, we can expect the following development:

- Expanded access to pre-tertiary and tertiary education through DE;
- An establishment of an open university incorporating all programmes of DE resulting into flexibility and integration in course offering and enrolment;
- National quality assurance system is in place at all levels;
- Positive view and embrace of distance education by all members and groups in society;
- Increased success rate resulting in lower attrition and drop-out rates as research, and financial resources have been pulled and mobilized to improve DE;
- Existence of a large of DE learning centres all over the county in the regions;
- Increased cooperation between institutions of higher education nationally, regionally with SADC and Sub-Saharan Africa as well as internationally.

<sup>7</sup> Adapted from Knowledge, Information and Technology, 2002. We are indebted to Multidisciplinary Group 7 of the Polytechnic of Namibia. Their work reinforces our envisioned and refocused DE system for Namibia.

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# **HIGHER DISTANCE EDUCATION IN SEYCHELLES: STATE-OF-THE-ART**

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## Background

### Introduction to Seychelles

The Republic of Seychelles is a small island state lying in the western Indian Ocean, 4° south of the equator and 1600 km off the East African coast. The Seychelles archipelago is made up of around 115 islands and covers an area of 455 square km.

According to provisional report of the last population statistics held in August 2002 the Seychelles has the population of 81, 177 with the population density of 178 square km of which 88% live on the main island Mahe.

The population is relatively of the young with 43% currently under 24 years of age of which 59% are of school-going age that is 5 and 17 years. The education system provides a 100% access to primary and secondary education up to cycle four, which accounts for the 91.1% literacy rate.

## Education System

### Mission

The mission of the Ministry of Education is to build a coherent and comprehensive system of quality education and training, reflecting shared universal and national values, which will promote the integrated development of the person and empower him/her to participate fully in social and economic development.

### Principles

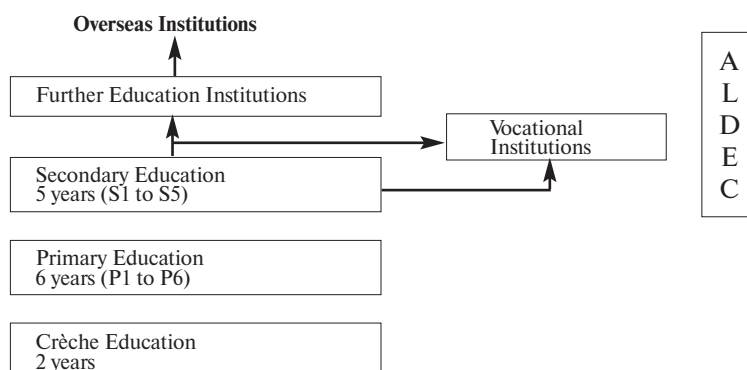
In a world where market forces and advances in communication technology are accelerating the trend toward globalization and the interpenetration of cultures, one of the main challenges for young people is to play their part as dynamic agents of change while maintaining the equilibrium which comes from a sense of identity and continuity. This is also the challenges for education today. The principles outlined below will guarantee that education remains firmly rooted in the history and cultural tradition of Seychelles, at the same time as it acts as an agent of transition and transformation.

The principles of **Equity**, **Quality** and **Accountability** relate primarily to the operation goals of the Education services, while the next four principles, namely, **Education for Empowerment**, **Education for Productivity**, **Education for social Cohesion** and **Education for Global participation** relate to the terminal goals of Education programmes.

## Structure of the Education System

For the past two decades, education in Seychelles has been distinguished by:

- A comprehensive coeducational system, available free to all children from 3 to 16 years of age and attended by nearly 100% of children of this age group;
- A system of further and higher education available free of charge to all Seychellois students who meet the selection criteria appropriate to a particular course of study for which the student applies.



## Further Education and Training

Full-time further education and training is provided in a number of institutions, these are principally the Seychelles Polytechnic, the Industrial Training Centre, the National Institute of Education (NIE), National College of the Arts, National Institute of Health and Social Studies (NIHSS) and the Farmers Training Centre (FTC). Among those institutions NIE, Seychelles Polytechnic, NIHSS and Seychelles Institute of Management (SIM) offer higher education courses usually in partnership with overseas institutions.

The Seychelles has no university. This is because the population is too small to supply viable course intakes. Generally, those wishing to continue their education at university level do so at overseas institutions both on and off campus.

## Distance Education and Open Learning Policy

To further realize its policy of *Education for All* Seychelles introduced Open Learning and Distance Education Policy (2001) in an endeavour to expand educational opportunities and to respond to the growing demand for personal/professional skills and knowledge. The mission contained within this policy is to provide increased access to educational opportunities that will prepare individuals to meet intellectual, economic, cultural and ethical challenges, so as to lead productive lives and unlock their potential for fullest growth and development.

Adult and continuing education, which up to that point had been administered by a special unit within Seychelles Polytechnic, was reorganised under the Adult Learning and Distance Education Centre (ALDEC) at the beginning of 1999. The new vision is to use modern open/distance learning systems to expand educational opportunities beyond what was on offer within the formal education and training system, while making equitable and cost-effective use of powerful new information and communication technologies. Support to Ministries and organizations in the area of in-service training and staff development was to be one of the main functions of ALDEC, which seeks to become the 'focal point' or 'hub' of open/distance learning in Seychelles.

The Centre also seeks to provide a 'flexible and affordable' alternative for upgrading the skills of workers overtaken by the pace of change in a 'technologically-driven environment'. At the same time ALDEC is to make tertiary education opportunities more accessible to key workers who could not afford to attend full-time courses locally or abroad, either for personal or work-related reasons. ALDEC is currently running a Post Graduate Diploma in Distance Education in partnership with IGNOU (Indira Gandhi National Open University) but, in this context, affiliation with overseas institutions for the distance delivery of external Diploma and Degree courses would need to be fully explored.

## Access to Higher Education and Training

Through various policies, strategies and programmes, Seychelles has made great strides in facilitating access by students to higher education and training. However, in view of the small population base, and the critical importance of trained and skilled human resources to future development initiatives, further increasing access at the post-secondary and higher education and training levels remains a priority.

Nearly all post-secondary graduates who meet entry requirements for tertiary studies and who wish to further their tertiary studies in an area of national need have access to higher education and training opportunity. Studies at this level are usually undertaken either locally through distance education programmes, or partly local and partly overseas through partnership programmes, or entirely overseas.

Barriers to access in higher education and training are minimized by two main interventions:

- a) the Scholarship Scheme For Pre-service Students Pursuing Tertiary Studies, which establishes a cost-sharing mechanism for students and state contributions toward overseas studies. Important parameters of the scheme include criteria for award of a full or partial scholarship, a Student Loan Scheme to assist students/parents with meeting their financial contributions.
- b) The twinning programmes with some overseas institutions of higher education and training, which have increased access by a larger number of students to more courses at lower costs.

Other supporting initiatives include a variety of short modular courses to accommodate part-time students and preliminary work on a National Qualification Framework to offer multiple entry and exit points to all learners, to ensure learners mobility and the accumulation of portability of learner credit at the pace set by the learners themselves.

## Legal Status of DE in Seychelles

In recognition of every citizen's constitutional right to education and in order to ensure the effective realization of this right, the state tries to ensure that every citizen has equal access to educational opportunities and facilities beyond the period of compulsory education. This led to the establishment of an Adult Learning and Distance Education Centre (ALDEC) within the Ministry of Education and Youth to ensure that educational opportunities are expanded beyond the formal educational system.

At present qualifications obtained through distance mode is given the same recognition by the state as those obtained through the traditional face-to-face mode.

Distance Learning Technologies which are mostly used in higher education in Seychelles are:

- print,
- computer,
- web-based/Internet,
- video.

All institutions use the first three modes listed above, whereas multimedia, telephone, radio, audio and television are not expanded.

## Quantity of Staff Working at Higher Education Institutions in Seychelles

Total	Among them at higher education institutions working upon DE forms						
	Teachers		Tutors		Auxiliary staff		Other
	Total	Those using ICT	Total	Those using ICT	Total	Those using ICT	
		6	6	4	4		

Source: Interviews with Heads of various higher education institutions.

## Quantity of Students in Higher Education Institutions in Seychelles

Total	Among them studying upon DE forms			
	Single mode	Dual mode	Mix mode	Other
	4	28	51	

Source: Interviews with Heads of various higher education institutions.

## Preparation Direction (Professions) Upon Which Studies are Being Conducted at the Higher Education Institutions Working on DE Forms

Name	Curricula presence		Using ICT tools in the learning process	
	Yes	No	Yes	No
National Institute of Education		✓		✓
Adult Learning & Distance Education Centre		✓		✓
National Institute of Health and Social Studies		✓		✓
Seychelles Institute of Management		✓		✓

At present all DE courses come from overseas course providers. However, there are four professionals undergoing Masters level training in course development for DE. Obviously, it is anticipated that they will be in a position to produce DE materials locally.



## Training Course Offered by Higher Education Institutions Working Upon DE Forms

Name	Course materials		ICT usage	
	Yes	No	In courses themselves	In the delivery modes
Masters in Distance Education	✓			
Bachelor of Education (Design Technology)	✓		✓	✓
Masters in Educational Management	✓		✓	
BSc Nursing & Social Studies	✓			
BSc Finance & Accounting	✓			
Masters in Education	✓			

Source: Interviews with Heads of various higher education institutions.

## Constraints Facing DE Institution in ICT Integration in DE

Factors constraining the development of DE in the Seychelles are:

- insufficient legislation at institutions level,
- insufficient human resources (curriculum developers and ICT specialists),
- inadequate funding,
- insufficient computers and other facilities,
- insufficient expertise to provide training locally,
- high dependency on overseas institutions for training and retraining of personnel for DE teachers and ICT specialists.

On the question as whether Seychelles institutions possess the capacity on using a specialised training course of IITE on training DE specialists for higher education institutions, the answer is yes. This is because a number of the higher education institutions in the country such as the National Institute of Education, Seychelles Polytechnic and SIM have some facilities although limited. However, we need to have training coaches for tutors as well as additional equipment and funding.

## Additional Questions

Existing partnership and networks available in DE	Edith Cowan University (Australia) IGNOU Commonwealth of Learning France Bolton Institute (UK) UNISA PRIMTAF
Donors who support research and development in DE	None
Scholarships available in DE	IGNOU / Commonwealth of Learning
Understanding the current use of modern multimedia technologies in DE	Very limited nationally
Existing DE materials and ways to update them	Very limited

## Conclusion

Costs of training in small, remote societies are unavoidably high in many areas of need, in that the issue of “critical mass” often precludes the establishment of local courses in many specialised or semi-specialised fields. In some instances (where “critical mass” has permitted), the cost of importing trainers has been lower than for “exporting” trainees.

One cost-reduction strategy that has been tried in Seychelles, particularly in the education sector; it has been the organisation of training programmes in partnership with overseas universities. These projects have allowed Seychellois students to follow part of the training in Seychelles before proceeding overseas to complete their

training in the respective universities. The hidden local costs associated with such schemes are considerable, although it is not always certain how far they contribute to effective cost-savings. However, there is agreement on the benefits in terms of local capacity-building.

Local educational institutions need to explore further the possibility of offering locally designed/developed courses in the open/distance modes. A reflection in this direction will ease competition for limited places on full-time courses and cope with the demand for upgrading and retraining at all levels.

Local expertise in online course development will be developed to gradually reduce reliance upon overseas courses and to ensure cultural appropriateness. This will help cut cost in the long run. A train-the-trainer professional development model will also be adopted to develop local capacity in various areas relevant to DE. Two key personnel of the Ministry of Education and Youth are currently undergoing relevant training. Distance education can be expensive to deliver. The hardware and software resources for delivery will be shared by institutions and agencies concerned. This also applies for human resources. The proposed conceptual model is provided below:

- the DE solution makes HE accessible to more people;
- will help realize three main aims:
  - to widen opportunities for life,
  - to use cost-effective alternatives to provide HE,
  - to provide long learning.

The second aim highlighted above is crucial since cost of sending students, especially in-service students on overseas studies, is unavoidably high. For course content delivery, printed materials will be used as a basis and electronic learning materials will be delivered via the Internet. Interaction will be made possible through such means as e-mail communication, tele-conferencing and face-to-face meetings. A decentralised student support networks will be adopted through the use of regional tutors and centres. Designated schools and post-secondary institutions will be used as centres. This will further cut on cost of providing new infrastructures and facilities. With the existing public transport system, travelling to centres for face-to-face meetings should not present a constraint for students. Also, travelling time to regional centres will not normally exceed an hour given the size of any of the islands. Finally, the solution proposed has the additional benefit of networking of institutions, schools, other stakeholders and communities.

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**HIGHER DISTANCE EDUCATION  
IN UNITED REPUBLIC OF TANZANIA:  
STATE-OF-THE-ART**

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The Open University of Tanzania (OUT) was established in 1992 by Act of Parliament No. 17. OUT was founded with the assistance of UNESCO. Mr Federico Mayor, Director-General of UNESCO, was present at the opening ceremony. It is the first Open University apart from the one which was established in the 1940s in South Africa. Since opening its doors to its first group of students in January 1994, it has been growing rapidly in the number of students enrolled as well as diversifying and strengthening its programmes of study. All of these developments communicate a message of progress.

In 1994 it enrolled something like 766 students. Clearly, there was a social demand and manpower demand for having such an institution. The people have been asking for this type of education for quite some time. As per March 2003 students' enrolment had reached 13,357.

### **The Open University of Tanzania**

*Title:* The Open University of Tanzania (OUT)

*Structure and History:* Of three recent attempts to launch a single-mode open university south of the Sahara Desert, only the Open University of Tanzania has resulted in an independent, free-standing institution. OUT established by Act of parliament of 1992 to provide the people of Tanzania (among the developing countries in Africa) a "second chance" to obtain higher education, since only about 1/3 of qualified Tanzanians were admitted to conventional face-to-face universities.

*Programmes:* OUT provides both degree and non-degree programmes in a variety of content areas, including arts and social sciences, education, science, technology and environmental studies, and educational technology. Four of its degrees are intended mainly for teachers.

*Enrolment:* By 1998 OUT enrolled approximately 6,000 students. Today there are 13,357 registered students as per March 2003 records.

*Course Development and Technology-Media:* Print media is the main technology used for all students except the visually impaired students who use audio-systems. The university still has no newer digital ICTs that include telecommunications and computers. This is an area where much assistance is needed from any source of funding for OUT to have an ICT infrastructure to be able to benefit from the highway traffic of knowledge.

*Student Support Services:* There are 22 OUT Regional Centers in different parts of the country and more than 60 study centers as well. The Head Office is in Dar-es-Salaam. An overall Regional Service Director is in-charge of all 22 regional directors. Each Regional Director is an overseer of all educational matters in the region. In addition, a number of smaller units are established in the local districts, where students organize their own study groups (See Fig. 1).

*Plans:* During its eleven years of operations OUT has made it a priority to cooperate with other educational institutions both in and outside of Tanzania, including the national library network. OUT is making an effort to make their distance learning opportunities accessible to more people by seeking an ICT infrastructure, which is not yet established.

Main character of the distance learning at OUT is the *usage of single mode and absence of dual and mix mode.*

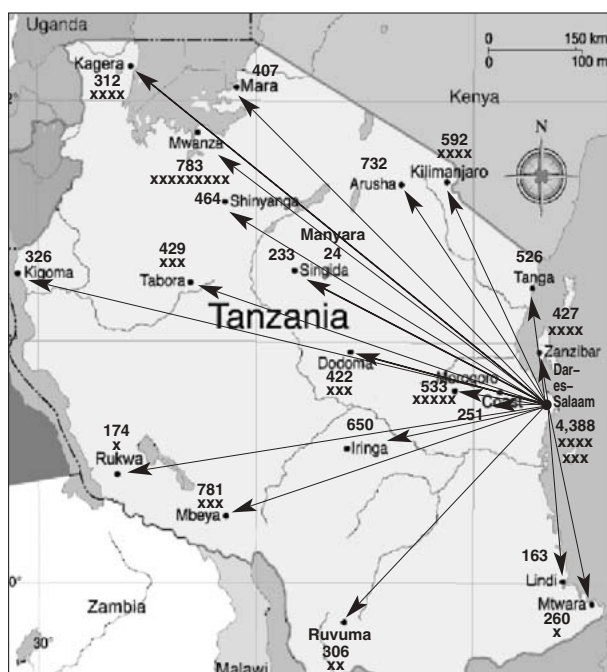


Fig. 1. Distribution of Regional Centers and Students' Study Centres

Grand total numbers of student = 13,357 dy 30 April 2003, including 174 from 16 foreign countries

KEY:

● Regional Centre

----- Country border

X = One Study Centre

FROM FOREIGN COUNTRIES:

Burundi	7	Malawi	1
India	1	Zambia	4
Uganda	59	Namibia	1
Ethiopia	3	Sudan	1
Kenya	86	Botswana	1
U. K.	1	Rwanda	1
Hong Kong	1		
Lesotho	4		
U.S.A.	2		
Hungary	1		

## Distance Learning Technologies

Distance learning technologies, which are used at OUT, are:

- printed materials,
- audiotapes.

But up till now there is *no broadly usage of multimedia and web-based/Internet technologies.*

There is not enough materials which reflect the needs of distance learning students.

There is literally no ICT-network connectivity, but there are plans underway to do so. The most hindering problem to the accessibility of ICT facilities nearly to all types of workers are funds for:

- buying computers,
- installing ICT-network connectivity.

In such situation *staff finds themselves cut off from the rest of the world.*

## Quantity of the Staff Working in OUT

Total	Among them working upon DE forms						
	Teachers		Tutors and part-time tutors from other institutes		Auxiliary staff		Other
	Total	Those using ICT	Total	Those using ICT	Total	Those using ICT	
	78	23	156	120	95	18	

## Quantity of Students in Higher Education Institutions in Tanzania

Total	Among them studying upon DE forms			
	Single mode	Dual mode	Mix mode	Other
29,245	13,357	-	-	

Source: The United Republic of Tanzania: Some Basic Statistics on Higher Learning Institutions in Tanzania 1997/1998-2001/2002. Ministry of Science, Technology and Higher Education. Dar-es-Salaam, July 2002, pp. 1-31.

Preparation directions (professions) upon which studies are being conducted at OUT:

- Bachelor of Arts (B.A);
- Bachelor of Arts with Education (B.A (Ed.));
- Bachelor of Commerce (B.Com.);
- Bachelor of Commerce with Education (B.Com. (Ed.));
- Bachelor of Laws (LLB);
- Bachelor of Science (BSc.);
- Bachelor of Science with Education (BSc. (Ed.)).

In 2002 masters and doctoral programmes were introduced.

## Duration

Average period of six (6) years.

## General Admission Requirements

### Option I

- CSEE or East African Certificate of Education or equivalent with five passes or three credits in approved subjects, obtained prior to the sitting the ACSEE or equivalent.
- One of the following combination of passes in the ACSEE or equivalent that is either two principal level passes in appropriate subjects or an appropriate subjects or an appropriate equivalent Diploma/Certificate approved by senate of the Open University of Tanzania. There are also additional requirements for different degree programmes.

### Option II

- Based on Mature Age Entry Examination candidates who have satisfied examiners in examinations set by Sokoine University of Agriculture (SUA), University of Dar-es-Salaam (UDSM) or any other recognized university.

### Option III

- Based on Foundation Course, a one-year course conducted by the Open University of Tanzania.

### Option IV

- Based on other awards: candidates from other institutions of higher learning will be considered on their own merit. These include a degree or an Advanced Diploma in a specified field.

The experts pointed out that among factors constraining the development of DE in Tanzania are:

- shortage of study materials,
- shortage of staffing due to financial constraint,
- teaching and methodological provision,
- ICT provision,
- financial provision.

Distance education is a new development, and most institutions which are supposed to provide support to distance education, like public libraries, documentation centres and other information units, are not aware of the needs of distance education students. This suggests that even staff provision cannot articulate clearly or cater for the needs of these new users. Therefore, they cannot provide for the needs of these students.

The experts also pointed out the *great necessity in training and retraining of personnel for DE – teachers, tutors and ICT specialists.*

OUT as a focal point of UNESCO IITE and Chair of UNESCO will need to be included on the list of improving capacities using a specialized training course of IITE on training DE specialists for higher education institutions. Essentially there exists a need on preparation of the personnel by this course and provision of equipment and financial resources to support OUT establishment as ICT infrastructure.

## APPENDIX

## **Proposed Course**

### **Introduction to Entrepreneurship and Innovation**

#### **1. Introduction**

This is an introductory course on Entrepreneurship and Innovation. The course is intended for professional development of first-year students intending to take business management studies at college level. Essentially the course is for pre-service and in-service students in the profession of business management.

##### **1.1. Eligibility**

The characteristics of the students to enroll for the course are those coming from secondary schools with entry qualifications of having successfully studied Mathematics, Commerce, Bookkeeping and English Language at advanced level. In addition they must have been working on any business entity for at least 3 years in either an organization or self-employed. This is a one-year Distance Education Certificate course intended to cater for all qualifying students within Tanzania and abroad.

##### **1.2. The Scope of the course and Characteristics of the Open University of Tanzania**

The Open University of Tanzania will use the 22 regional centers throughout Tanzania where there will be ICTs facilities for the students' use. The programme will be equivalent to one unit course of 45 hours spread in one academic year. Currently OUT basically uses printmedia and audio technology to deliver its courses. Plans are underway to have digital ICTs with Internet and e-mail services. The Open University of Tanzania is a single - mode Distance Education with its head office at Dar es Salaam, 22 regional centers, 4 district sub-centers and 66 students' study centers. OUT is currently the only single-mode Distance Education Institution in the country.

##### **1.3. Evaluation of the Course**

The course will be evaluated through two assignments carrying 10 marks each, two timed tests with 20 marks in total, and an annual examination worth 60 marks. This is the current evaluation structure, which the Open University of Tanzania uses.

## **2. Aim and Objectives of the Course**

The aim of the course is to impart professional knowledge and skills in the business field.

The general objective is to improve the quality of Entrepreneurship and Innovation in order to face the business challenges which have been a result of globalization and economic revolution. Essentially, after going through the course students will be able to do the following things:

1. Will have a clear understanding of entrepreneurs and innovation, business, globalization marketing strategies.
2. Will be able to apply marketing strategies.
3. Will be able to apply knowledge and skills of financial control and banking.



4. Will be able to apply business management and human resourcing.
5. Will be able to develop convincing business projects and proposals.
6. Will be able in creating self-employed business.
7. Will also be able to use corporate business.
8. Will apply knowledge and skills on how to go about with credit facilities.
9. Will be able to use international business.
10. Will apply knowledge and skills in management of production process.

### 3. Course Content

1. Conceptualization of entrepreneurship and innovation, business, globalization marketing strategies.
2. Marketing strategies.
3. Financial control and banking.
4. Business management and human resources.
5. Business projects and proposals.
6. Self-employed business.
7. Corporate business.
8. How to go about with credit facilities.
9. International business.
10. Management of production process.

### 4. Delivery Mode of the Course

The Open University of Tanzania is the only single-mode Distance Education in the country using postal services to deliver print and audio materials to students. The same delivery mode will be used to deliver this new course using asynchronous approach until such time when the university has digital ICTs in place that will also use synchronous approach.

Since this will be a new professional course, it is planned that it will be developed by a professional team of various experts including instructional designer, graphic designer, multimedia expert. It is also determined that the course will use a stand-alone approach due to the nature of the university being an ODL where students are geographically scattered all over the country. Therefore, the learning materials for this course will be developed in-house.

### 5. Approach

The current culture of the Open University of Tanzania uses a **generative approach** in designing and developing all its courses and study materials. Hence, this new course will also use the already established generative approach to be designed and developed.

### 6. Practical Consideration

Tanzania is a developing country with its unique challenges to be considered with developing courses, study materials and delivery approaches. The practical considerations, which are most crucial in Tanzania, are technologies that require electric power and Internet e-mail services. In most cases power cuts are rampant, and Internet and e-mail services are not reliable. Hence, print media will always be used in parallel with the modern ICTs in delivering this course as well.

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**CASE STUDY OF A POTENTIAL APPLICATION  
OF THE UNESCO IITE COURSE  
“ICTs IN DISTANCE EDUCATION” IN GHANA**

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## Step 1: Context

### Background Information

Much as the educational reforms of 1986 gave impetus to the need for distance education at the tertiary education level in Ghana – which has resulted in the five public universities engaging in distance education programmes mainly as an attempt to extend access to the numerous prospective candidates wishing to pursue university education – and the President of Ghana recently launching a special initiative in distance education, it is increasingly becoming clear that over 95% of the Ghana’s universities’ academic, administrative, and clerical staff have little or distorted view of the current generation of distance education methodologies, systems, delivery and operational mechanisms.

This became abundantly clear at the 12 November 2003 colloquium at Tamale, Ghana, organized by the Secretariat of the Association of African universities (on the theme *Distance Education and African Universities*). During the interactions and the question-and-answer session after an address on the theme, the reactions from almost all top echelon of the universities seemed to suggest that their understanding of the concept of distance education is very narrow and tailored toward the erroneous notion that distance education (DE) is synonymous with being “an extended wing of the university by engaging in, or offering, correspondence courses to those out there outside the university walls”, to quote the chairman for the occasion.

This is a sad situation that needs an urgent remediation. The perception of DE by the top people who matter most if DE is to thrive in Ghana must be **correct** and **current**. If those in the universities have no clear-cut vision, nor have a misty and hazy idea/understanding of what’s and how’s and why’s of DE then how on earth can they convince the Government of Ghana to invest in, or throw its weight behind dual-mode nature of the universities which has been the hue and cry of many of us (DE operators) of late?

### Aims and Objectives

After going through the course that I would like to develop, the students (participants) will be expected to:

- demonstrate a better understanding of the DE system,
- be in a better position to **explain** and **sell** the DE mechanisms to top Ghana government officials (especially those in the relevant ministries),
- propagate and seek local and international support (financial and otherwise) for a vibrant DE system in Ghana in particular, and Africa in general,
- advocate for an integration of DE into all tertiary institutions in Ghana to complement the traditional modes of delivery (e.g. as dual-mode or mixed-mode institutions).

### Course

This is for the professional development, and the planned coverage includes the following:

- understanding the concept of DE,
- history (and generations) of DE,
- teaching and learning in the DE system,
- learner support systems,
- old and new ICTs and their role in DE,
- course design in DE,
- institutional role and responsibilities in DE delivery and management,
- practical policy issues in DE.

## Students/Participants

This course is intended for the following:

- all the Vice-Chancellors of Ghana's five public universities,
- all Registrars of Ghana's five public universities,
- all Finance Officers of Ghana's five public universities,
- all Deans of faculties and Directors of institutes in Ghana's five public universities.

The students/participants will total between 60 and 70 in all. All have access to computers (at office and home), telephone and fax facilities, audio and video facilities, and Internet facilities (at office). Three out of the five universities have the AVU set-ups and, therefore, have facilities for computer-conferencing, audio-conferencing and video-conferencing. Only a handful of the students have had prior knowledge and experience in DE. Because of the nature of their work, it is envisaged that the participants will be able to devote about half an hour a day for the course, if the predominant ICT is **not** print. Three of the public universities are in southern Ghana (at Accra, Winneba, and Cape Coast) and easily within reach of each other, whereas the remaining two are up the country side – one in the middle belt (at Kumasi) and the other very far away in the north (at Tamale).

## Institutional context

I intend to team up with the staff at the Distance Learning Centre of the Ghana Institute for Management and Public Administration (GIMPA) to deliver this course. GIMPA has an "advanced AVU" set-up and the staff has been involved with designing, developing and delivering short-term online and off-line courses (mostly in collaboration with UNESCO and the World Bank) for at least the past five years.

## Timeframe

If all works out well, it is my intention to develop the course materials by the end of 2004, try them out, or pilot test them (in collaboration with GIMPA) with participants from Ghanaian private universities throughout 2005 and first deliver the course to the targeted students/participants from the public universities in January 2006.

## Step 2: Delivery Model

### Delivery System

Because of the nature of their duties and their heavy schedules of work, it is my intention that the participants will be provided with a variety of learning resources such as:

- study guides (printed and online), which they can read through whilst traveling in their vehicles, or resting at their homes after a busy day in the office;
- audiocassettes, that they can listen to whilst traveling in their vehicles;
- videocassettes, which they can watch whilst they are relaxing at their homes after the day's work;
- CD-ROMs that they can slot into their office or home computers. I even intend that these CD-ROMs carry texts, images, graphics and even video clips;
- a few optional prescribed readings, mainly in outline forms and highlighting the major ideas or points here or there.

The course will be delivered mainly by the employ of new, modern, and interactive ICTs – and mostly from the premises of GIMPA – by satellite and over the Internet network, and predominantly in the synchronous mode through the AVU facilities of computer and video-conferencing at scheduled times (especially during the scheduled monthly rotating Committee of Vice Chancellors' meetings around the country). Nevertheless, provision will be made for some aspects of the course to be delivered in the asynchronous mode.

## **Step 3: Envisaged Development**

Since this is a new course, I intend to be guided by existing specialized training courses (such as the one we are currently doing), as well as use the services and rely on the advice, suggestions, reviews, comments and criticisms by a host of DE professionals and experts across the world with expertise in instructional design, graphical design, DE curriculum design, dynamics of integrating multimedia in the teaching-learning process, and subject my drafts for trials by experts from UNESCO, COL and World Bank, for example.

## **Step 4: Teaching Materials**

### **Approach**

I intend to use various approaches for the learning resources. For example, some materials will be based on the wrap-around approach, since initially I will have to design and develop the materials mainly around existing published texts (off-line and online) from various DE sources, since I am no expert in “DE-isms”. Then sharing ideas together with the staff at GIMPA, I am sure I will tap on their rich resources to come out with some stand-alone packages that will have the African context in view and the Ghanaian culture and unique situation as the background. There is even the possibility that we might end up using the integrated approach some of the time. I cannot be definite at this point in time. (Perhaps, if I had met the Director and the Training Officer at the Distance Learning Centre at GIMPA when I called there on a visit last Thursday, 20 November 2003, I would have had preliminary feeling of which approach will predominate).

## **Step 5: Instructional Design**

### **Generative Approach**

It is very clear right from the word go that the Vice Chancellors, Registrars, Finance Officers and the other Principal Officers from the Universities (i.e. Deans and Directors) lack the proper understanding of the underpinnings of Distance Education and that there is the need to get them on board the DE bandwagon as soon as practicable, decisions regarding the structure of the course and even the teaching devices to be used (in this case predominantly by video-conferencing interactions and interactivity), will have to be made right from the beginning. That means the design concept will have to be developed before any learning resources are developed. In other words, the generic approach to the instructional design will predominate. Then, in collaboration with the experts from GIMPA the predetermined design will be subjected to review and scrutiny.

### **Post-Development Model**

Since I will subject my design for review by other experts outside Ghana, I can envisaged that at times in point, feedback from the DE operators will lead to situations where I and the GIMPA team might need to further develop materials and even pedagogical elements that will have to be infused or incorporated into the planned, or may be even ongoing, learning resources. When such solicited for and valuable suggestions come our way we will have to tap on the rich advice of these seasoned DE experts.

### **Recursive Approach**

I can still foresee the situation whereby revisions to the teaching-learning design(s) are made on advice, or a result to the situation on the ground, as the professional development of the top hierarchy in Ghana's

universities in the basics of the DE system, modalities, methodology, operation and management progresses. When such the need arises the entire team will have to rise to the occasion to avoid derailing this very important DE indoctrination, if I should call it so. (I am so desirous to succeed with this quest that I do not want to count anything out).

## **Step 6: Other Practical Considerations**

Even though I have said all along that I will work closely with the DE staff at GIMPA, it may be necessary to be open to tap the knowledge and experience of other DE developers and operators within Ghana, in Africa and outside the continent all along the way, especially those who operate the virtual university systems in their set-ups.

A very important aspect of the course is the learner support services to be incorporated into the system to keep these top-class-but-very-busy students/participants motivated to keep on going through the programme. Apart from creating several opportunities for them to interact and share ideas together, I would want them not to see this exercise as a burden but rather as one where they are acquiring a deeper understanding of their respective roles in planting, watering and nourishing a good DE educational crop in Ghana. Hence, there is the need to consider a very affordable and necessary range of media into the learning package, so much so that even in their leisure times they will be self-motivated to fish out for more valuable information on DE during the course and thereafter. Incidentally, it is my hope that the course will span over a 12 month period (i.e. from January 2006 to December 2006), given the participants will be going at their own pace and studying at their own time, despite the monthly synchronous sessions, using the video-conferencing facilities at the AVU facilities at their universities.

My major concern, which I do not have a ready answer is what happens to the students at the other two universities without video-conferencing facilities (i.e. those at the University of Education, Winneba and at the University for Development studies, Tamale)?





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**PROPOSAL ON THE COURSE ON INFORMATION  
AND COMMUNICATION TECHNOLOGIES (ICTs)  
IN DISTANCE EDUCATION IN KENYA**

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## Introduction

To train practitioners (lecturers and administrators) involved in the delivery of distance education on ICT usage. This proposal describes the target group, the course duration, the mode of delivery and assessment procedures.

## Participating Organizations

Kenyatta University will be the lead organization.  
Other partners will be all six public universities in Kenya.  
The African Virtual University (AVU)  
Commission for Higher Education  
Ministry of Education Science and Technology

## Background

The major problem facing distance education in Kenya is lack of trained personnel in distance education (DE), in particular personnel conversant with usage of ICTs. Another problem is lack of organizational framework in the delivery of DE.

The project is, therefore, important in building capacity among practitioners of distance education to enhance efficiency, improve access and lower costs. The project will develop a critical mass of practitioners who will train others.

## Target Audience

The target audience will be lecturers and administrators involved in the management and delivery of DE. These will be full-time employees of Kenyatta University and other public universities who are also involved in face-to-face teaching. They will be holders of a minimum of Master degree in their area of specialization, however the majority has no training in distance DE. The selected participants will have access to Internet facilities.

## Delivery Model

The mode of delivery will be both face-to-face and online, supplemented by print materials. The content will be presented by facilitators trained in the areas of DE and ICTs. Relevant case studies will be used. The interactions will be three ways between facilitator and participants and among participants themselves. The interaction will be face-to-face through workshops and seminars and online through discussion forums, e-mails and other online platforms.

## Assessment

The assessment will be through formative and summative evaluation strategies.

(i) Formative: These will include continuous assessment tests, participation in discussion forums and assignments.

(ii) Summative: This will be an end of course evaluation based on a DE related project. The project will reflect concepts and materials covered throughout the course.

## Duration

The duration of the course will be eight weeks composed of 40 hours. This will be phased as follows:

- (i) Three days face-to-face – to introduce the course and the online package.
- (iii) Three weeks online – to study materials presented online and submit assignments.
- (iv) Three days mid-course face-to-face – to review online activities and address issues and problems experienced.
- (v) Three weeks online.
- (vi) One final week face-to-face.

## Anticipated outcomes

- Trained critical mass of trainers in DE.
- A more efficient delivery and management system of DE in Kenya.
- A better partnership among practitioners of DE in Kenya.
- An enhanced ICT network to support DE in Kenya.

## Request for funding

Cost per participant – \$1,000 X 3 persons X 7 institutions X 2 sessions = \$41,000

Cost per facilitator – \$2,000 X 5 facilitators X 2 sessions = \$20,000

Course materials = \$10,000

Contingency = \$10,000



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# **HIGHER DISTANCE EDUCATION IN MAURITIUS: STATE-OF-THE-ART**

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## Country Context

Mauritius is an island state with a population of about 1.16 million and an area of about 1865 square kilometres. It obtained independence in 1968, is a member of the Commonwealth and is currently a republic with a parliamentary democracy. As a small island state, it was designated as one of 38 vulnerable island states at the 1992 Earth Summit. Mauritius has a wide cultural and linguistic diversity: although English is the official language, French, many Asian languages, Creole and Bhojpuri are commonly used. The population is aging: demographic projections indicate 15% will be over 60 by the year 2025. Mauritius is ranked as a middle-income developing country: its economy is based on agriculture, textiles, manufacturing, tourism, and off-shore and financial services.

Mauritius' economy is changing from the first phase, based on labour intensive, low-tech industries, to more skill-intensive area, such as communications, services, production of high-value commodities and data, and financial services: this has increased demand for an educated workforce equipped for these new roles.

## Tertiary Student Population

The tertiary student population is estimated at around 22,292 in December 2002 compared with 20,488 a year earlier, representing a growth rate of nearly 9% over the period. About 79% students were undertaking their studies locally, with the public-funded institutions (PFIs) accounting for 46% of the total or 10,259 students and the distance education/private providers for 32.5% or 7,242 students; the remaining 21.5% or some 4,791 students were pursuing their studies overseas.

## Distance Education/Private Providers

### Background/prior experience

Distance education provision in Mauritius began as early as 1865 with University of London External Programme courses, which provided print materials and opportunities to take examinations in Mauritius. Other British organizations offered correspondence education in the 1960s. The creation of Mauritius College of the Air (MCA) in 1971 began locally-based open distance learning (ODL), and MCA became a tertiary education institution in 1988. After a series of studies by ODL experts, the 1991 education master plan included provisions for ODL: three tertiary education institutions, University of Mauritius, the Mauritius Institute of Education and the Mahatma Gandhi Institute set up distance education units. As well, Mauritian enrolments in University of London programmes increased fourfold from 1994-1998.

University of Mauritius has developed from a university focused on providing trained manpower for the development of Mauritius to an institution providing academic degree courses. It offers core modules in degree programmes through distance learning, and its ODL enrolment increased sevenfold, from 646 to 4,725, between 1994 and 1999. University of Mauritius also offers ODL programmes in collaboration with overseas institutions, such as Charles Stuart University.

The Mauritius Institute of Education (MIE) is responsible for teacher training in Mauritius. It currently offers distance programmes leading to an Advanced Certificate in Education, or to an Early Childhood Education certificate. MIE also offers programmes in partnership with Napier University, Scotland and Edith Cowan University, Australia.

Mahatma Gandhi Institute began ODL programmes in 1995 and works with MIE to offer some components of the Advanced Certificate in Education programme.

Over 60 private providers, including academic and professional bodies from UK, Indian, Australia, Africa, Singapore and France offer ODL programmes at certificate, diploma, degree and post graduate levels to over 4,000 students. Many students do not receive sufficient support, and the National Accreditation and Equivalence Council (NAEC) is developing a code of practice for overseas institutions who wish to operate with local partners in Mauritius.

Mauritius College of the Air originally developed correspondence courses for professional and academic upgrading, using print, audio, video and occasional face to face sessions. Initially, there were quite high drop-out rates (about 30%) for A level programmes provided for in-service teachers, due to lack of preparation of participants, and staff for the demands of ODL, and lack of continuous assessment. After changes to the student recruiting process, assessment practices and staff development, drop-out now ranges from 10 to 15%.

In 1995 MCA's mandate was revised and a distance education unit established to develop institutional capacity for distance education delivery, to offer adult and continuing education through ODL, and to serve those seeking access to the educational system. MCA now serves over 1,200 distance learners annually and offers distance programmes in early childhood development, languages, cooperative studies, transport, marketing, and empowering women through self help, as well as courses toward degree programmes in computer applications, tourism and commerce.

MCA in collaboration with Napier University, Scotland, developed and offered a distance delivered professional librarianship training to improve information services in schools and documentation center: the programme leads to a Higher Certificate in Librarianship and Information Science. MCA also developed and offered a Certificate Programme in Librarianship and Information Science. Completion rates for both programmes have been between 80-90%.

To meet the needs of the cooperative sector, MCA offered an Advanced Diploma in Cooperative Studies for officers who can then provide grass roots training.

In 2000, MCA and MIE collaborated to offer training for pre-school teachers in a national programme supported by UNICEF.

Programmes in transport and marketing are offered in conjunction with UK institutions that also accredit the qualifications. MCA is also working with a UK organization to develop and offer a distance training programme for firefighters.

MCA has a partnership with Indira Gandhi National Open University to offer some of its degree programmes, and to provide a certificate programme for the empowerment of women.

MCA also provides English and French language development programmes and a course in French writing skills, and this year, is offering, new competency-based English language courses.

Although MCA offers a somewhat flexible admission process that considers work experience and a pre-enrolment interview, it is sometimes constrained by partners' more rigid admissions criteria, by difficulties in assessing prior learning or work experience and by employers' demands for a recognized pathway to qualifications. Learners are offered study skills seminars, face-to-face tutorials, telephone tutoring, assessment and counseling.

To offer a range of courses economically, MCA tends to adapt and adopt existing distance education materials if they are relevant and appropriate. If nothing appropriate is available, MCA develops materials using a course team approach with staff from other institutions as subject experts. Print is the main medium supplemented by audio or video tapes, and face-to-face sessions. Mauritius has increasing access to computers and the Internet, and MCA is examining options for online courses.



## Current Situation in ODL

Distance education and open learning is occupying an increasingly important segment of the tertiary education market locally, with nearly one in three students pursuing tertiary studies, partially or exclusively, through this mode as at December 2002. It is worth noting that most, if not all, of the 30 or so private providers of tertiary education locally, operate in collaboration with overseas institutions and use of a mixture of distance education mode and face-to-face tutorial in delivering courses. Students in general sit for their examinations under the supervision of the Mauritius Examinations Syndicate (MES), although a few institutions make their own examination arrangements, in collaboration with the overseas institutions.

6,377 students sat for examinations set by an overseas body at MES and 978 in private institutions, while an additional 50 students took their examinations in the public-funded institutions (PFIs). Distance learners at the tertiary level, therefore, estimate at 7,405 in December 2002, as opposed to 6,420 a year earlier, representing a growth rate of over 15% compared with an average of 9% for the whole sector. Some 7,242 students were studying privately, either through private institutions or on their own, and remaining through the PFIs. Accountancy constitutes the most popular field of study amongst distance learners, with three in ten students opting for studies in this area, followed by computer studies (27%) and administration/management (17%). The other fields of study attracted a relatively smaller but nonetheless significant number of students; they include law 256 (3.5%), marketing 246 (3.4%), mathematics/statistics 191 (2.6%), languages 191 (2.6%), economics 137 (1.9%), engineering 109 (1.5%) and finance 108 (1.5%). Some 2,573 (35%) students were enrolled on a professional, 2,120 (29%) on a degree and 328 on a postgraduate programme; the remainder on diploma and lower level courses.

## ICT in Mauritius

### The ICT Landscape

Modern information and communication technologies hold great promises for small island economies like Mauritius. Academics, policy-makers and business executives alike claim that the economic development of a nation lies more on its ability to access the appropriate information and transform it into new products and services to compete in the global market. In this new configuration, ICT constitutes one of the most powerful tools to open up new avenues of sustainable growth, to expand the economic horizons of Mauritius and build a more diversified and resilient economic base.

Mauritius is taking significant measures toward achieving its broad ambition to become a cyber island and to serve as a telecommunications and Information Technology hub in the region. ICT is seriously viewed as the vehicle par excellence to uplift the young republic to a higher level of well-being and comfort and to remain globally competitive.

### Institutional Framework

Although the exploitation of ICT dates back to the late 70s, it was essentially being used at that time for data processing operations within both the public and private sectors. One of the major landmark events contributing to the development of the ICT sector was the Government decision to set up an appropriate institutional framework in the late 1980s.

The National Computer Board was set up to advise government on the formulation of national policies for the development of the ICT sector and to promote an IT culture in the country. The Central Informatics Bureau and the Central Information Systems Division were created to manage and operate the information systems within the Civil service. The State Informatics Ltd. was initially set up to assist in the computerization of the Civil service. In 1997, full-fledged Ministry of Information Technology and Telecommunications was created to formulate and implement policies regarding the development of the ICT sector.

Electronic Transactions Act is already in place to promote E-business and E-commerce. Legislations have also been passed to make better provision for privacy and data protection, electronic consumer protection and prevention of computer misuse and cyber crimes. With this solid institutional back up, the stage is set for

Mauritius to embrace the global information revolution and reshape its social and economic strategy. The strategy is based on knowledge, Information and Communications Technology, and the legal framework conducive to the development of the ICT has been spelt out so as to move toward an IT culture.

## **Global Economy**

The objective of the government is to develop the ICT industry into a leading sector, a fifth pillar of the economy that will provide more remunerative employment and placing Mauritius in the league of top performers in the global economy.

The availability of skilled IT manpower is vital to achieving the government vision to transform Mauritius into a cyber island. In 2001, the number of IT professionals was around 1,900. Preliminary estimates show that the number of IT professionals required to support the ICT sector would range between 7000 and 13,000 by 2006.

E-education is a major component on which the authorities are according high primacy. Work has already started toward the formulation of a comprehensive programme for promoting IT in all schools through a Computer Proficiency Programme. The entry of IT into the classroom will help to meet the skill requirements of an emerging “New Economy” in Mauritius.

## **Information Super Highway**

Telecommunication infrastructure in Mauritius has evolved from an obsolete network with very few lines into a modern and fully digitalized one using state-of-the-art technologies. The successful commissioning of the SAFE (South Africa Far East) submarine fibre-optic cable system places Mauritius firmly on the digital map and opens wide the gateway to the global information superhighway.

The SAFE project constitutes a major breakthrough for international communications in Mauritius as it provides the country with an alternative reliable high-speed link to satellite routes with the rest of the world. It also helps to bridge the digital divide between Mauritius and developed countries. The ultimate speed of SAFE is 130 Gbps, and the system can convey 6.3 million simultaneous telephone channels. SAFE now firmly connects Mauritius to Europe and Asia into the Global Information Infrastructure and enhances our position as a regional telecommunications hub, with the major advantage that it provides an interrupted and secure connection to the Internet even during cyclones that sweep the Indian Ocean.

Upon the launch of SAFE, Mauritius introduced the ADSL, (Asymmetric Digital Subscriber Line). Faster access to the Internet, permanent connection, simultaneous voice or fax calls while surfing at a low flat rate tariff are the major advantages of ADSL, which makes Mauritius a preferred back office operations centre for major European companies seeking to outsource certain activities such as data entry and processing, call centres, fund administration, payroll accounts payable and general accounting.

## **High Teledensity**

Digitalization has permitted the country to adopt state-of-the-art technologies to facilitate universal access to telecommunications. With the introduction of state-of-the-art switching systems and high capacity microwave and optical fibre cable systems, Mauritius can boast of having the number of connected lines jump from 65,000 in 1991 to 310,000 in 2002. As such, Mauritius has Africa's second highest fixed-line penetration of over 26 per cent for its 1.2 inhabitants just behind Reunion Island which has a teledensity of 38 per cent. This has brought the teledensity to 26 per hundred population, a rare achievement for a nation outside the Western Europe – North America zone.

The vision of transforming Mauritius into a cyber island is backed by bold measures like the liberalization of the telecommunications. Consequently, telecom services now stand totally liberalized as from January 2003.

The Information and Communication Technologies Authority (ICTA) was set up by Act of Parliament in late 2001. The ICTA is the successor institution to the Mauritius Telecommunication Authority (MTA) which was created in 2000 to regulate telecommunications in Mauritius.

Its main objectives are defined, inter alia, as follows:

- Democratize access to information through the use of Information and Communication Technologies (ICT);
- Create a level playing field for all operators in the defence of consumers;
- Licence and regulate information and communication services;
- Encourage optimum use of ICT in education, business and services;
- Promote the competitive edge of Mauritius as an international player;
- Facilitate Research and Development (R&D) in ICT and advise on new technologies.

The Authority is empowered to ensure that services are reasonably accessible at affordable cost and to investigate complaints from consumers and take appropriate corrective measures thereon.

The setting up of ICTA comes at the time when Mauritius is undergoing profound changes in the field of communications and broadcasting. After decades of state control, the electronic media have recently been liberalized, and two private radio stations are actually operating.

In telecommunications too, the process of liberalization has already been initiated with the coming into play of competing providers of cellular phone and Internet services. The telecommunications market will completely liberalized by the end of 2003.

Given the new context of liberalization and competition and the convergence of Information, Telecommunications and Broadcasting technologies and services, ICTA is destined to play an effective role in regulating and licensing the activities of present and future players. It will also be instrumental in the choice of new technologies in the best interests of the country.

## Options for Addressing Issues and Challenges

It is with the backdrop described above, those proposals for the future of technology-enhanced DE will be made. However, at this point in time in the Mauritian context, only ICT-based proposals for DE will not suffice. Solid structural systemic proposals will also have to be made as these proposals will set the foundation for the successful implementation of the ICT-based proposals.

In this respect, institutions in Mauritius need to explore appropriate organizational structures to promote effective collaboration in ODL, to enable credit transfer, institutional commitment, functional contracts and good management of the process. Joint course development can save costs.

Although a number of MCA staff has completed graduate education in ODL, and MCA provides short-term in-service training for course authors and tutors, formal education in ODL practice is not readily affordable. More cost-effective and flexible staff development should be available to enable DE staff to learn about a rapidly changing field, especially the use of ICT in distance education, and marketing ODL, and other areas identified by needs analysis and performance appraisal.

Employers are required to pay a training levy to government, but ODL providers are not at present eligible to receive a share of this revenue. Enabling ODL providers to receive a share of training income would provide them with necessary operating funds.

There is also a need for the creation of a national database on education and training needs was developed and produced information updates, educational providers would be in a better position to respond rapidly and efficiently.

Other recommended strategies:

- Promotion of distance education and development of public awareness of ODL;
- Joint development of distance education materials, where feasible;
- Provisions of high quality learner support service.

The integration of ICT in the design, development, production, delivery and management of courses and programmes will need to be carefully planned with an integrated approach, as any ad-hoc measures will not be sustainable. This holistic approach will imply setting the roadmap by equating different functions of Distance Teaching in terms of presenting the content, providing for interaction, assessment and student support with the three distinct purposes of the “hard” technologies, namely storage technologies, carrier technologies and

delivery technologies with a view of optimizing the Distance Education system. This strategy will, in turn, have to be implemented both at the national and international level. At the national level, the roadmap will be laid down in a participative manner. The involvement of all stakeholders within the Mauritian DE field will need to be tapped to ensure commitment of all parties, which is the most important ingredient for success. Another important facet to be taken into account for the roadmap is that we should refrain from reinventing the wheel whenever possible, but rather adapt the existing ICT for DE in the Mauritian context, what is feasible and exploitable.

For the sake of this report, I will explore one innovative ICT proposal which is in the realm of digital television. This proposal will be envisaged on a pilot basis. At first glance, the digital television service seems to provide a solution to a fundamental issue of access: the signal provides a ubiquity of service in that every household (and workplace) which has at least one television set. This feature, combined with its ability to provide datacasting seems to answer many of the issues confronting educationalists in providing training beyond the walls of the college, direct to work places and homes. On the face of it, digital television seems to offer a robust signal that solves the slow data rate of the Internet, limiting learning interaction. However, access is through a set top box (STB) which acts an interface for bi-directionality and decodes digital signals into analogue for viewing on a normal TV set.

Standard digital television brings two important features: datacasting and multicasting. Datacasting brings with it a whole range of services such as teletext. Multicasting will significantly increase the number of channels available – most likely to be subscription services – and in doing so, may open the door to education channels. This increases the opportunity of education and training providers to deliver education and training programmes direct. Interactive television brings new opportunities for education and training content. Much of the discussion about the delivery technologies is still at a very early stage, whilst the commercialization of products from Set Top Boxes to television interfaces is still developing. It may turn out that the best theoretical option for the use of interactive television in distance education, may be seen as the least commercially beneficial, and therefore the system will not be developed at all.

Digital television does not provide a convergent solution. There are other systems of delivery that are very effective in distance education, including the Internet and video-conferencing. In fact, an effective trainer uses all kinds of delivery techniques, and uses them in appropriate contexts with appropriate content. As is being slowly recognized by the commercial world, the trend is toward market and technology fragmentation, not convergence. The wise training provider will assess digital television as another delivery option amongst a raft of technologies, and look forward to the day when digital content can be efficiently applied across all, rather than having to develop new courseware content for each.

New technologies are always seductive and often offer potential for educational applications. Digital television is no different. New technologies should be evaluated against criteria that underpin best practice in education and training. This new technology must respond to sound pedagogical principles, i.e.:

- flexible;
- individually tailored and addressed courseware;
- material provided on demand;
- accessible;
- equitable;
- moderated human-machine interface interaction;
- adaptable to various learning styles.



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**MERITS AND DEMERITS OF WEB DELIVERY  
OF DISTANCE EDUCATION**

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**An acknowledgement:** This table represents a beginning; surely more merits and demerits can be identified. Of importance would be merits and demerits applicable, and perhaps unique, to your local contexts. The list is intended ONLY to inspire you to think critically about:

- a) the merits and demerits of web delivery of distance education,
- b) how leaders might plan for, design, and apply web delivery in a way to overcome some of the potential pitfalls and make good use of web delivery’s advantages.

You are invited to suggest other merits and demerits!

<b>Features of Web-based Design/Delivery of Learning</b>	<b>Merit of (or the inherent value of)</b>	<b>Demerit of (or the inherent weakness of)</b>
<p>Access</p> <p>(asynchronous – async and synchronous – sync)</p>	<p>With async delivery (ex – Web), flexible access – anywhere, any place, any time delivery is possible. Many can participate, since delivery is via a common user interface, that is, a web-browser.</p>	<p>With sync delivery (ex–video and audio conf), inflexible and inconvenient access, especially across time zones. With both async and sync, a “Digital Divide” exists; not everybody can participate.</p> <p>Some who traditionally studied at a distance can no longer afford to do so, or do not have the technical or information literacy needed.</p>
<p>Assessment</p>	<p>Enables new levels of immediacy and more options with respect to feedback and interactions; supports online “real-time” as well as scaffolded and generative assessment.</p>	<p>Unfortunately, much web-based relies on old forms of assessment such as proctored written exams and assignments. Much of it applies very traditional test construction such as true–false and multiple choice items.</p>
<p>Computer-mediated Communication (CMC)</p>	<p>Newer CMC conferencing systems (for example, threaded discussions and chat rooms) are relatively seamless. Studies substantiate CMC improves adult learning. For example CMC facilitates learner-centered learning that enables the social construction of knowledge via the expressions and incorporation of multiple viewpoints and application of collaborative team-based school work. CMC also helps to develop high level thinking, since ideas and task-oriented discussions are the focus.</p>	<p>With Web-based discussion tools, flow and harmony are sometimes lost. Some studies reported learners sometimes feel frustrated, distracted, and lonely.</p>
<p>Cost</p>	<p>Delivery costs are lower than those of traditional classroom, though fixed costs of production are higher. In the US – switching from classroom-based to resource-based (such as web-based) means we can save money by reaching “economies of scale.”</p>	<p>To make money with web-based programmes, institutions need to enroll large numbers of students. In the US a problem existed – actual enrollments in web-delivered distance education were as high as expected enrolments (at least, during first five years).</p>



<p>Databases of Information</p>	<p>Opens up many learning resources, for example, online search tools, libraries, and documents; provides access to many content experts, including peer learner experts. Always accessible.</p>	<p>Searches can be very time consuming. Learners must sort through much information to find the right, and valuable, integrative material. Downloading and printing, too, often take much time. Not always easily accessible; might have a “Digital Divide.”</p>
<p>Didactics (teaching and/or instructional features)</p>	<p>Supports an individualized, integrated, open learning system; enables a constructivist learning model (learners actively construct knowledge by interacting with content, teachers, and peer learners/teachers), where instruction becomes learner-centered (multimedial and interactive) rather than teacher-driven, top-down information-centered.</p>	<p>Unfortunately, as with assessment, some web-based design/delivery of learning resembles traditional classroom lecture and textbooks “thrown” online instead of the self-paced resource-based learning of the traditional distance model. Learners complain when this happens and likely will not enroll for more web-based courses.</p> <p>Not all learners and cultures may be comfortable with a learner-centered, constructivist model. Some use only the web-course intact materials, failing to interact with linked materials and with teachers and other learners.</p>
<p>Hypertext, Hyperlinks, and Hypermedia</p>	<p>Provides learners non-linear navigation/branching through various multimedia materials; enables them to control their learning paths. Supports various learning modalities and styles. Provides teachers a way to generate custom, easily changeable course materials, with options, versus standard printed textbook.</p>	<p>Some learners may become “lost in cyberspace;” some become frustrated when links don’t work or disappear. Ease of creating course materials is relative depending on teachers’ interests, aptitudes, and skills. For some, the “links” become merely a new delivery mechanism for old “stuff.”</p>
<p>Interaction One definition of interaction: “the process consisting of the reciprocal actions of two or more actors within a given context” (Vrasidas &amp; Mclsaac, 2000, p. 25).</p>	<p>Supports high levels of interaction between learners and content, between teachers/mentors and learners, and among learners. Significance – Based on sound learning principles, that is, active, rich, deep, problem-focused, real-world learning; enables peer-based collaborative learning, extending interaction from local to global communities.</p>	<p>The key to superior results with the web-based design/delivery of distance learning is the quality of the interaction, but some teachers are not prepared to orchestrate it, and some learners are not prepared to engage in it. This can result in feelings of isolation.</p> <p>With Web delivery some believe it is difficult to develop the quality of the correspondence study teacher-tutoring relationship.</p>
<p>Learners – Meets Special Needs</p>	<p>Some learners (for example, certain ethnic groups and the reluctant, gifted, physically disabled, and remote), who might not participate, do participate.</p>	<p>Does not meet all needs, especially of those who have inadequate reading, writing, and publishing skills and those who need immediate feedback and face-to-face interaction. Some groups, such as women, will likely participate less than they traditionally have.</p>

Learning Networks	<p>Creates a vehicle to help students “learn to learn” and for learning to become a lifelong process; these are needed skills in our knowledge-based, global economy.</p> <p>Supports development of lifelong learning communities, where families and communities get involved.</p> <p>Supports cross cultural communications with the hope of negotiating differences for positive outcomes. Here learning can initiate healthy social change.</p>	<p>Some might not want to be connected; in fact, collaborative work that attempts to “network” might aggravate those who prefer to work alone. Remember, too, global connectivity does not bring true knowledge.</p> <p>To become usable knowledge, information must be managed, analyzed, critiqued, and cross-referenced by learners. Finally, cross-cultural experiences might be superficial instead of deep and meaningful.</p>
Market/Demand for	<p>In the US industry, traditional educational institutions, and learners are demanding web-based asynchronous technology-driven courses.</p>	<p>In the US enrolments have been lighter than predicted. Indications are there is still resistance to change.</p> <p>If the focus becomes forging new marketplaces with the purpose of increasing enrolments, learning might become secondary.</p>
Technical	<p>Web browsers are device-independent (instead of proprietary) and relatively user-friendly to install and use.</p>	<p>Hardware and software can mean installation and maintenance problems.</p> <p>These can become a source of frustration to both teachers and learners. Continual technical support is needed.</p>
Value of	<p>Enables worldwide uniformity/quality of institutions, programmes, courses, instruction.</p>	<p>The ideal is not reality. There are issues with institutional/programme accreditation as well as how to assign course credit.</p> <p>There are also issues with teachers’ credentials, students’ admission, intake, and retention. A primary problem is emotional resistance to change.</p>
Workload	<p>Common perception among administrators and learners new to web-based is that it will take less time for both online facilitators/coaches and students.</p>	<p>Generally, however, learners engage for longer periods of time than in traditional classrooms.</p> <p>Most teachers, too, devote considerably more time preparing and delivering web-based learning than traditional classroom-based learning.</p>

This table is an appendix “cut” from the research paper based on scholarly distance education literature. Originally created by Linda Black in 2001, this work has been revised a number of times. Professor Michael G. Moore and Linda Black incorporated the ideas/appendix in the workshop on *Online Distance Education*.

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**BRAIN RESEARCH, IMPROVED LEARNING  
METHODS, AND APPROPRIATE ICTs**

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## Summary

Many believe that, to move toward an ideal world, every human mind should be given the opportunity for optimal lifelong learning, and there is a growing related belief that this represents a basic human right.

**The Human Brain** is by far the most complex device on the planet, and yet most of us take it for granted. We, humans, have some 100 billion neurons (10 times more than the apes), and these neurally active cells (perceiving, thinking, learning, etc.) are connected by the amazing *1.5 million kilometres* of nerve fibres. Over the past 2 million years (a very short period in evolutionary terms), the hominid brain-body weight ratio has almost quadrupled, with most of this unprecedented growth being in the cerebral cortex. This article emphasizes the dynamic, 'under-construction' nature of the brain/mind of homo sapiens. Although we have been around for about 150,000 years, it is only in the past approximately 50,000 years that a dramatic growth in artefacts beyond stone tools appeared. Why did it take man 100,000 years to develop these abilities? What does it tell us about the mind, intelligence and learning?

**The Human Mind** is not the brain but what the brain does. It is not a single organ, but a system of modules and organs whose operation was shaped by natural selection. They can be thought of as psychological faculties, each with a specialised design that makes it an expert in one arena of interaction with the world. These interactions enter through the windows of the body's five senses, which do not have equal standing in humans. It is the interaction between vision, touch and sound that is of most importance in enabling humans to understand and learn about the universe around them, their society, and themselves.

**Vision** is man's primary sense around which his mind has evolved. This remarkable sense has the largest cortical area (almost 50%) devoted to its activities. The visual cortex is split into many areas, each processing an aspect of sight such as colour, shape, size, stereo, depth, etc. Observed images are reflected by matching patterns of neuronal activity on the surface of the visual cortex which are then converted into higher level abstract mental models. The visual system as a whole is not dedicated to any one kind of behaviour, but instead creates abstract representations of the world (mental images rather than retinal images), and inscribes them on 'mental commons' for general use by *all* the mind's mental modules. A mental image is simply a pseudo-3D sketch that is loaded from long-term memory rather than from the eyes.

**Sound** has changed the human brain radically because complex language has recently annexed large parts of the left hemisphere (previously given over to visuo-spatial functions), thereby creating the asymmetry not found in any other animal. The implication is that, in evolutionary terms, human language is very young, is still 'under construction', and is far from being fully integrated into the brain. Although analysing a stream of spoken words is highly complex, infants do not need to be taught the basics of hearing and speaking language. By contrast, reading and writing are difficult to learn at any age. Printed text is only a few hundred years old, and therefore, on the evolutionary time scale, reading has not even begun to become an innate ability. Hence, the unnatural nature of reading and writing have serious implications for learning. Even for the literate people on this planet, in cognitive terms, text is the least efficient and effective of all the available communications media.

**Memory** is not a fixed thing or singular skill, but rather is a process where a transient stimulus creates a persistent change in the brain. A complex set of multiple memory locations and systems are responsible for our best learning and recall. The variety of ways, in which information is stored and retrieved, provides a better platform for understanding memory. *Explicit/Declarative Memory* comes in several forms, including the more word-based semantic memory (by far the weakest of our retrieval systems), and the event-type episodic memory (unlimited capacity, and used naturally by everyone). *Implicit memory* includes both the procedural and reflexive retrieval pathways. *Working memory* comprises a central executive and two subsidiary slave systems; i.e. the visuo-spatial sketch pad and the phonological loop. Working memory's role in human cognition and learning could hardly be more important, since it integrates and coordinates memory, attention and perception.

**Natural Learning** is what the human brain does best. There are predetermined sequences of development in early childhood, including windows of opportunity for laying down the basic hardware necessary for later learning. All babies are born with the innate potential to learn and speak any language and many languages. Natural selection also shaped man to be intuitive physicists, biologists, engineers, psychologists, and

mathematicians so that he could master his local environment. Although these different ways of knowing are innate, this does NOT mean that knowledge is innate. The key to getting smarter is growing more dendrites and synaptic connections between neurons. The brain's architecture has the inherent capacity for every individual to significantly increase their intelligence. The mind learns optimally when it is appropriately challenged in an environment that encourages taking risks. Humans have survived by trying out new things, usually in small groups, NOT by always getting the 'right', tried-and-true answer - that's not healthy for growing smart, adaptive minds.

**The Need for Fundamental Change** is being amplified by the recent emergence of neuroscience, which is providing insights challenging conventional educational beliefs entrenched in the current 'factory model'. Modern learning must move from the memorization of facts to the acquisition of cognitive skills - thinking, learning, and reasoning. Meaningful learning generally occurs through combinations of different approaches to memory. The mind recalls best with context, a global understanding, and complete pictures to remember. The current dominant 'show-and-tell' teaching methods do not take into account the strengths and weaknesses of the crucially important *working memory*. These methods inevitably overload the phonological loop (new and weak), whilst underutilising the visuo-spatial sketchpad (ancient and powerful).

**The Role of Text** needs urgent reappraisal. Employing the amazing power of vision, our primary sense, to detect text is like repeatedly using an articulated lorry to fetch sweets from the corner store. The alphabet is like a funnel, squeezing all sense data into and through the narrow passage of print. A wonderful tool has become a tyrannical master for many people who find reading too difficult - '*text-o-phobes*'. There were over 40 million adult text-o-phobes in the USA in 1997. Anyone who is not 100% proficient in reading and writing is seen as deficient across a whole range of skills. Yet, learning to read (and write) is no more natural than, but equally as complex as, learning to play the piano. However, no one uses the inability to play the piano as a measure of one's lack of intelligence, or as a basis for discrimination. As long as we leave text in its dominant role in our global education system, that system can NEVER be equitable.

**The Role of Technology** in the form of ICT-enhanced learning is starting to provide a wide range of improvements to current learning materials via the application of interactive digital multimedia, and via the asynchronous delivery of digital material, whether in a contact institution or in distance mode. We are at the early stages of a long and exciting global initiative where technology must not drive, but improved pedagogy should, based on our growing understanding of how the human brain/mind learns. Improved new learning environments can be built using a variety of digital multimedia, i.e. audio, graphics, visualization, animation, simulation, and even text (but in the right contexts). However, only **virtual reality** is able to create environments combining ALL required aspects, i.e.:

- the overall context, global understanding, and complete 'big' picture;
- fully utilising the many possible avenues for input and learning in the human mind;
- a wide variety of quality hands-on experiences which encourage learners to choose, explore, manipulate, and test the learning environment provided.

**Teaching and Learning in the Developing World** presents an extreme version of the global crisis. At all levels, and in all African countries, the education sector is struggling to maintain the status quo, let alone make radical changes. Yet traditional face-to-face delivery will simply not be able to scale up provision to the levels required by Africa's demand. If we in Africa are only prepared to tinker with the current bricks-and-mortar-based education systems imported 'as is' from the developed world, dominated by text-intensive 'show-and-tell' methods, and unresponsive to our knowledge of how the human mind best learns, then those systems will continue to deteriorate and fail. The changes need to be fundamental, and creating new learning materials relevant to Africa's situation is an excellent place to start. The multimedia (especially virtual reality)-based new learning environments that are essential in the developed world, are even more needed in Africa. These materials must not be imported, but must be locally produced to address the wide range of learning needs of Africa's excluded majority taking full account of the local literacy, language and cultural issues.

We know what to do, we have the resources, but do we have the coordinated commitment? If the USA could mobilize itself between 1962 and 69 to reach the moon, surely the world can mobilize itself to achieve UNESCO's 'Education for All' within a decade or two. Are the world's hundreds of millions of excluded people more remote and less important than the moon?

## Part I THE HUMAN BRAIN/MIND

### Overview of the Brain

We each have our brains, use them mercilessly, take them for granted in a wide variety of ways, seldom stopping to think what unique devices they are. It is generally agreed that the human brain is by far the most complex device on the planet. According to Rita Carter<sup>1</sup>:

*“The human brain is made of many parts. Each has a special function: to turn sounds into speech; to process colour; to register fear; to recognise a face or distinguish a fish from a fruit. But this is no static collection of components — each brain is unique, ever changing and exquisitely sensitive to its environment. Its modules are interdependent and interactive and their functions are not rigidly fixed... The whole is bound together in a dynamic system of systems that does millions of different things in parallel. It is probably so complex that it will never succeed in comprehending itself. Yet it never ceases to try.”*

The adult human brain weighs about 1,350 grams. Whereas this represents about 2% of an adult human’s weight, the brain accounts, on average, for 20% of our energy consumption. Surprisingly, the brain needs 8 to 12 glasses of water a day for optimal functioning, hence dehydration is a common problem. The cerebral cortex, the most recently evolved component, constitutes the highly folded outer region of the brain. The folds maximize the brain’s surface area, but if laid flat on a surface, the cortex has the size of a large napkin. The brain is made up of cells, 90% of which are glial cells which give the brain structure, and handle the boring administrative duties. The ‘exciting’ cells which are actively involved in perceiving, thinking, learning, etc. (the neurons) take up the remaining 10%. Fruit flies have 100,000 neurons, monkeys have 10 billion neurons, whilst we, humans, have some 100 billion neurons. On average, adults lose about 10,000 neurons per day, and have half the number of two-year old.

The content of brain activity lies in the patterns of connections and patterns of activity among neurons. In particular, learning is a critical function of neurons that cannot be accomplished individually — it requires groups of neurons<sup>2</sup>.

Neurons have very specialized cell shapes, with a cell body, one axon, and many dendrites. Each axon usually splits to connect, via synapses, with thousands of dendrites from many other neurons. To help understand the amazing level of connectivity this produces, it is useful to know that each brain’s nerve cell is connected by *1.5 million kilometres* of nerve fibres<sup>3</sup>. Neurons are electro-chemical devices, converting chemical and electrical signals back and forth, as they integrate, generate and process information. The information impulse always flows from the cell, to the axon, then via the synapse to the dendrites of the next cells. Whether or not a particular part of the brain is ‘active’, all normal neurons are continuously firing.

### Overview of Brain Evolution

The first ‘brains’ are thought to have emerged about 500 million years ago. These were very simple compared with the wide range of such organs which abound on the planet today — brains have proved beneficial for survival, and so have developed dramatically!

Humans and chimpanzees appear to have had a common ancestor between six and nine million years ago, when the hominid line broke away. Over the past 50 million years of primate evolution, the brain-body weight ratio of all off-shoots of our common lineage remained within a fairly small range. This was also true of the early

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<sup>1</sup> Carter, R. “Mapping the Mind”. Phoenix, p. 8, 1998.

<sup>2</sup> Greenfield, S. “Journey to the Centres of the Mind”. New York: WH Freeman Company, 1995.

<sup>3</sup> Jensen, E. “Teaching with the Brain in Mind”. Association for Supervision and Curriculum Development (ASCD) Publications, pp. 1-3, 1998.

hominids, until over the past two million years (a very short period in evolutionary terms), the hominid brain-body weight ratio almost quadrupled<sup>4</sup>. Most of this growth was in the cerebral cortex, where humans have developed the largest area of uncommitted cortex of any species on earth<sup>5</sup>. No specific function has been identified so far, so it is sometimes referred to as the ‘association cortex’.

Man’s outsize brain is, by any standard, an extraordinary adaptation from our common ape ancestors. Controversy is rife around a range of interesting theories to explain this phenomenal growth. One such theory postulates that complex human language emerged first, and stimulated the growth. However, as described below, this is highly unlikely. Complex human language appears to be a recent emergent property of the fully *physically* grown brain of homo sapiens. Complex language appears to have emerged as the human mind developed within that brain.

Homo sapiens, with the current brain size, appeared on the planet only about 150,000 years ago. In evolutionary terms, this means that the human brain is very young, and the mind even younger. These facts raise two fascinating, fundamental questions:

- In the longer term, over the next two million years, will the brain continue to grow at the current accelerated rate? Why should it stop with the current version of humans?
- In the shorter (but still quite long) term, over the next 150,000 years (and with our current brain size), how much more will the human mind develop? How will our consciousness, intelligence, and learning grow?

The second of these questions is particularly relevant to this article, which emphasizes the dynamic, ‘under-construction’ nature of the human brain/mind. Although we have been around for about 150,000 years, it is only in the past approximately 50,000 years that a dramatic growth in artefacts beyond stone tools appeared. Why did it take 100,000 years to develop these abilities? Were we physically able, but not yet mentally ready? At that stage, did we *consciously realize that we can learn* (rather than the automatic learning that all animals experience), and find that to pass on this learning to other humans, we needed to leave some kind of record in the form of cave paintings, artefacts, etc.?

## The Mind

The relationship between the human brain and mind is thought by many to be one of the oldest and most fundamental of mysteries. The mind is not the brain but what the brain does (in particular, the brain processes information), and not even everything it does, e.g. metabolizing fat and giving off heat.

The mind is not a single organ, but a system of modules and organs whose operation was shaped by natural selection to solve the problems of the hunting and gathering life led by our ancestors throughout most of our evolutionary history. Whether or not we establish exact boundaries for each module, it is clear that the mind has a heterogeneous structure of many specialised parts. These modules or organs can be thought of as psychological faculties or ‘mental modules’, each with a specialised design that makes it an expert in one arena of interaction with the world.

The human mind is a product of evolution, so the basic logic of our mental modules (and their combinations as ‘mental organs’) is specified by our genetic programme. The mental modules are either present in the minds of apes (and perhaps other mammals and vertebrates), or arose as further adaptations of the minds of the common ancestors of humans and chimpanzees that lived in Africa between six and nine million years ago.

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<sup>4</sup> Mithen, S. ‘The Prehistory of the Mind’. 1977.

<sup>5</sup> Howard, P. “Owner’s Manual for the Brain”. Austin, Tex: Leornian Press, 1994.



A remarkable feature of the mind/brain is its capacity to function as a complex adaptive system on many levels and in many ways simultaneously. There are emergent properties of the mind as a whole system that cannot be recognized or understood when the parts alone are explored<sup>6</sup>. Underlying this, thoughts, emotions, imagination, predispositions, and physiology operate concurrently and interactively as the entire system interacts and exchanges information with its environment. But how does it sense its environment?

## An Overview of the Senses

For the mind to function, it must take in data that it can use for its processing. The only way the mind can do this is through the sensory perceptions that enter through the windows of the body's five senses. These senses do not have equal standing in primates or humans. What is sensed, how quickly does it reach our senses, how useful is it to the human mind throughout its development and learning?

- *Touch* involves physical contact with the environment using the entire surface of our body as the sense organ (but with dramatic variations in sensitivity in different regions of the body). It happens as quickly as the contact process involved, whether we are being touched (a handshake, a bullet), or we are touching (a footstep, typing). It is particularly important during infant development, with much of its activity becoming subconscious with frequent repetition. It retains its importance throughout life by confirming our immediate surroundings, what is happening to us, what we are doing, and providing feedback on what we have just done. But it tells us little of our more distant surroundings, and provides little information on what might be about to happen, both in the short and longer terms. Of particular importance is its collaboration with visual perception ('touch-eye coordination', and especially 'hand-eye coordination'), which will be shown to be of major importance to learning, memory, and retrieval.
- *Taste and smell* also involve physical contact, but at the molecular level, coupled with sophisticated chemical analysis within highly specialised (and related) parts of the body (mouth/tongue and nose). Smell provides some indirect information on what may be happening even in our more distant surroundings, but it arrives very slowly and with no clear directional data. Hence smell relies on touch, sound and vision to give better quality backup information based on its initial input. Taste plays a crucial role in our primary process of life sustaining energy provision, but tells us almost nothing about the dynamics of our external environment. Neither sense appears to play a significant role in our conscious understanding of and learning about the world about us, especially after early development.
- *Sound*, again, involves physical contact, but this time by sensing pressure variations in the air via the diaphragms in two highly sensitive and specialised organs (ears). It provides a great deal of information about the dynamic external environment, but of varying quality (due to many disturbances of the medium, distortion, interference, and falling off significantly with distance). The two ears provide directional and distance information fairly quickly (at the speed of sound), but of fairly poor quality so that the mind usually transfers attention to touch and particularly, vision. Sound is good for monitoring the dynamics of our near to medium environment (stationary, inert objects create no sound, and we do not project clicks to investigate the environment, unlike bats and cetaceans for whom sound is the primary sense). Unlike touch, taste and smell, sound provides a great deal of information that allows creatures to anticipate what might be about to happen, particularly in the short term. Sound appears to have several unique strengths, including its obvious value at night (not just for nocturnal creatures), as well as being the primary medium used by creatures that have developed the wish to express themselves (especially consciously). Emitting sound provides a much wider spectrum (amplitude, frequency, types) than touch or smell, and with a sustainably low energy bill. Emitting light of sufficient intensity and variability for daytime broadcast has proved too energy-expensive for most animals to date, although some nocturnal (e.g. fireflies), and aquatic (e.g. angler fish, squid) creatures have developed very limited capabilities.

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<sup>6</sup> Caine, R.N. & Caine, G. "Education on the Edge of possibility". ASCD Publications, p. 104, 1997.

- *Vision*, unlike the other four senses, is non-tactile, since photons of light are discrete quanta of energy, with no mass. In the other senses, the stimulus interacts indirectly with the brain via intermediary sense organs, which inevitably reduces the quality and speed of the impulse. But, since the retina is an integral component of the brain, light is unique in that it interacts directly with the mind as each photon is absorbed by a rod or cone in the retina. Vision provides a flood of information of excellent quality, under normal daylight conditions, about both the dynamic and the inert external environment, and virtually instantaneously (at the speed of light!). The two eyes provide immediate and highly accurate directional and distance information, as well as shapes, colour, orientation, shading, relative size, relative speed, and much more. Vision is excellent for monitoring most aspects of the near, medium and distant environment – most sound waves are dissipated over a few hundred metres, but photons can and do reach us from the horizon, and even the edge of the universe! Vision provides an order of magnitude more information than sound which allows creatures to anticipate what might be about to happen, not only in the short term, but also in the medium and even long terms. It is clear that for daytime, land-based creatures, vision is uniquely powerful amongst the five senses. But it cannot do everything alone. We have already mentioned the crucial role of ‘touch-eye’ coordination, and that sound ably supplements vision’s weaknesses (at night, when something happens behind us, etc.). But it will be shown below that visual perception relies on a wide range of inputs from all other senses (but particularly touch and sound) to complete the mental models we use to think.

It is the interaction between vision, touch and sound that is of most importance in enabling humans to understand and learn about the universe around them, their society, and themselves. How well are we mixing the combination of these to satisfy the learning needs of the world’s wide variety of learners, particularly the billions in the disadvantaged world with the greatest need?

## Vision and Perception

Man, like all primates, is primarily a visual creature, and his mind has evolved around this remarkable sense. Vision is the sense<sup>7</sup>, which has the largest cortical area devoted to its activities, and is referred to as the ‘senior sense’<sup>8</sup>.

### Seeing

Each visual stimulus, having been converted to electric signals in the retina, is shunted on to the visual cortex at the back of the brain. The visual cortex is split into many areas, each processing an aspect of sight such as colour, shape, size, stereo, depth, etc. The heart of the visual cortex, V1, mirrors the world outside in which each point in the external visual field matches a corresponding point on the V1 cortex<sup>9</sup>. Hence, when simple shapes (e.g. a honeycomb) are observed, the image is reflected by a matching pattern of neuronal activity on the surface of the visual cortex. The centre of the retina, the fovea, is much more densely packed with neurons and, therefore, captures far more detail. As a result, the cortical ‘map’ is distorted, as the neurons responding to the dense central area of the visual field take up a much greater cortical area, i.e. the ‘picture’ produced on V1 is a little like that seen through a fish-eye camera lens.

Vision is much more than the capturing of these cortical ‘maps’. Hubel and Wiesel proposed their classic theory which provides a credible mechanism for how the visual system goes to the next level, and detects patterns<sup>10</sup>. Following their lead, other researchers have proposed that groups of cells in the V1 visual cortex are at the bottom of a hierarchy of feature detectors. The idea is that a cluster of these cells feed into a single higher-

<sup>7</sup> Pinker, S. “How the Mind Works”. Penguin, p. 211-20, 1997.

<sup>8</sup> Cotterill, R. “Enchanted Looms: Conscious Networks in Brains and Computers”. Cambridge University Press, p. 384, 1998.

<sup>9</sup> Carter, R. “Mapping the Mind”. Phoenix, pp. 184-5, 1998.

<sup>10</sup> Hubel, DH. “Eye, Brain, and Vision”. New York, Scientific American, 1988.

level pattern detector, or complex cell, in another part of the visual cortex; and, similarly, many of these complex cells feed into a hyper-complex cell. It is argued that these high-level cells fire only in response to a very specific feature or stimulus, such as a face, a car, a deer, or a tree<sup>11</sup>.

Visual perception is one of the most complex processing tasks that the brain is called upon to perform. It is not surprising, therefore, that when it goes wrong, the results can be dramatic. It is significant that unlike ‘seeing disorders’, which may cause degradation of the image, blurring, loss of colour vision and so on, ‘visual perception disorders’, e.g. agnosia, cause only gross errors in perception (sufferers are unable to identify objects as a whole, e.g. a face, a deer.). This suggests that perception works through a higher level ‘language’ that can be compared with the written word in its level of specificity. Our visual perception seems to work in the same way, by ‘seeing’ or perceiving objects as complete forms, not as sums of their constituent parts.

### Visual Perception and the Mind’s Eye

Intuitively, it seems unlikely that analysis of lines and curves can fully account for the richness of our perceptions, which involve knowing what the patterns represent — recognizing what is ‘out there’. A wide range of indirect functions of the visual cortex converts these retinal depictions and patterns into higher level abstract mental descriptions, or mental models, which underlie the interaction between seeing and thinking known as ‘*mental imagery*’.

As all sighted people know from personal experience, the brain somehow analyses, in real time, these moving cortical ‘pictures’ produced on each retina and arrives at an impressively accurate sense of the objects being observed. The accuracy is impressive because the problems the brain is solving are, literally, unsolvable. David Marr was the first to describe vision as having evolved to convert these ‘ill-posed problems’ into solvable ones by adding assumptions about the world<sup>12</sup>. These inherent visual ‘assumptions’ are revealed by the many well known artificial and natural optical illusions used in party games (and psychology research). Hence, illusions unmask the assumptions that natural selection installed to allow our large visual cortex to solve unsolvable problems and know, much of the time, what is out there.

Marr described vision as a process that produces from images of the external world a description, or mental model, that is useful to the viewer, but that is NOT a verbal one. It is an internal, abstract model (Pinker might say it is in ‘mentalese’). If vision did not deliver such abstract mental models, every other mental faculty (e.g. language, walking, grasping, planning, imagining, etc.) would need its *own* procedure for creating one. For example, when vision deduces the shape of an object that gave rise to a pattern on the retina, all parts of the mind can (and do) exploit vision’s abstract mental model. Some components of the visual system siphon off information to motor-control circuits that need to react quickly to moving targets. However, the visual system as a whole (almost 50% of the cerebral cortex) is not dedicated to any one kind of behaviour, but instead creates abstract representations of the world (mental images rather than retinal images), and inscribes them on ‘mental commons’ for general use by all mind’s mental modules.

In other words, *mental imagery is the engine that drives our thinking (both real and abstract) about objects in space*. Visualizing a shape feels like placing a picture for inspection in the mind’s eye, which is a very different experience from silently vocalizing a discussion of abstract issues. Creative people are famous for ‘seeing’ in their mind’s eye solutions to both real and abstract problems, e.g.:

- Faraday and Maxwell visualized electromagnetic fields as tiny tubes filled with fluid.
- Kekule found the benzene ring structure, after a visual dream of snakes biting their tails.
- Einstein mentally saw what it would be like to ride on a beam of light or to drop a penny in a plummeting elevator. He explained that, ‘my particular ability does not lie in mathematical calculation, but rather in visualising effects, possibilities, and consequences’.
- Painters and sculptors try out ideas in their minds, and even novelists visualize scenes and plots in their mind’s eye before putting pen to paper.

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<sup>11</sup> Cohen, D. “The Secret Language of the Mind”. San Francisco, Chronicle Books, pp. 52-3, 1996.

<sup>12</sup> Marr, D. & Nishihara, H.K. “Representation and recognition of the spatial organisation of three-dimensional shapes”. Proceedings of the Royal Society of London, B, 200, 269-294, 1978.

The brain is capable of satisfying the demands of such a mental imagery system where information must flow freely from memory instead of up from the eyes, since the fibre pathways to the visual areas of the brain are two-way. They carry as much information down from the higher, conceptual levels as up from the lower, sensory levels, and therefore are equipped to download memory images into visual maps.

What is a *mental image*? The visual system uses a pseudo-three-dimensional (pseudo-3D) sketch which, in a very real sense, is a picture in the head. It is a mosaic of elements that stand for neurons in the visual field. This topographically organized cortical map is a patch of cortex in which each neuron responds to contours in one part of the visual field, and in which neighbouring neurons respond to neighbouring parts. Shapes are represented by filling in some of the elements in a pattern that matches the shape's projected contours. Innate shape-analysis mechanisms process information in the sketch by imposing reference frames, etc.

A mental image is simply a pseudo-3D sketch that is loaded from long-term memory rather than from the eyes.

## Sound and Language

The process of hearing is itself a fascinating, multidisciplinary subject, and the detailed workings of the ear and the neural pathways carrying sound inputs from each ear to the brain's hemispheres reveal much about evolution. For example, each hemisphere has evolved a distinct role in sound processing, so sounds are processed (and therefore experienced) differently depending on which ear they enter. However, in this section the intention is to focus not on how sounds are detected by humans, but on how and when the processing of a special range of sounds associated with man's uniquely complex language evolved, as well as on how man has developed this capability to express himself first in speech and very recently in text.

### The Evolution of Complex Language

Man's development of complex language changed the landscape of the brain radically because once language had taken hold it appears to have rapidly annexed large parts of the left hemisphere, previously given over to visuo-spatial functions. In doing so it created the asymmetry that distinguishes the human brain from that of any other animal. The reason for the emergence of complex language remains unknown, but the brain itself provides some clues<sup>13</sup>.

Animals do not have specialised language areas — their brains are more or less symmetrical, and their own noises are produced and processed along with environmental noises on both sides. Similarly, language initially develops in infant humans, together with other sound processing, in both hemispheres of the brain. By the age of five, however, in 95% of cases language, but NOT any other sound processing, shifts to lodge only in the left hemisphere, in the temporal (side) and frontal lobes, areas which are marked by a distinct, one-sided bulge (not seen in any animals, even chimpanzees). After this migration, the abandoned early speech areas in the right hemisphere are given 'back' to the activities for which they were probably previously being used. These involve the processing of environmental noises and spatial skills, i.e.:

- the rhythm and melody of music,
- the 'where' of things in the outside world,
- fine hand movements — including gestures, but NOT formal sign language.

So human language appears to have behaved like a hermit crab, moving around the brain until it finds a location which, though alien, best fits its structure. What does this behaviour tell us? According to William Calvin, most brain regions are, to some extent, multifunctional. As a result, this often enables *new functions* to first appear by making spare-time use of some pre-existing part of the brain<sup>14</sup>. The implication is that, in

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<sup>13</sup> Carter, R. "Mapping the Mind". Phoenix, pp. 224-9, 1998.

<sup>14</sup> Calvin, WH. "How Brains Think". Basic Books, p. 12, 1996.

evolutionary terms, human language is very young, is still ‘under construction’, and is far from being fully integrated into the brain. Rodney Cotterill comes to a similar conclusion<sup>15</sup>:

*“There is a growing body of evidence which suggests that no new neural systems evolved to exclusively serve language<sup>16</sup>, and that there was no discontinuity of language from other cognitive systems<sup>17</sup>. Instead, language appears to be a new mechanism that Nature constructed out of old parts<sup>18</sup>, these being cortical maps of sensorimotor origin.<sup>19</sup>”*

The previously visuo-spatial region where language has recently taken up tenancy is also rich in connections to deeper brain structures that process sensory stimuli. It is one of the places where stored impressions from different senses, particularly touch and hearing, are brought together and reassembled into coherent memories – i.e. it seems that language ‘best fits’ in a region where several different and important functions converged.

The language cortex completely surrounds the auditory, but with two main areas – *Wernicke’s* and *Broca’s* – having been recognized for more than a century. Recent brain imaging studies suggest that other areas are also involved, including part of the insula. It is thought that the language cortex is probably split, like the sensory cortices, into many different processing regions and sub-regions, but brain imaging studies have yet to fully confirm this. However, damage to cortical areas adjacent to these two main ones can cause a wide range of very specific language problems, providing indirect evidence of the functional sub-division of the auditory cortex.

## Speech Processing

Analysing a stream of spoken words is highly complex. First, the brain has to recognize that what is coming in is, in fact, language. Speech is then shunted to the language areas to be processed, while environmental noises, music, and non-verbal messages (grunts, screams, laughs, sighs, etc.) go elsewhere. Once speech has been identified, as many words as possible are assigned some sort of meaning, whilst simultaneously the complex ribbon of sound is broken down into its elements – separate words or phrases. The two things are necessarily done together because without meaning it is almost impossible to make out language construction.

- Analysis of word **meaning** is carried out either in or very close to Wernicke’s area.
- The cortical area that finds **structure** in incoming speech has yet to be identified. The eminent linguist Noam Chomsky has produced an elegant hypothesis for some kind of ‘language organ’ in the brain, but what form it might take and where it might be located are not known. Steven Pinker has built on this theory, suggesting that the language organ may not be a neat module at all<sup>20</sup>.

Broca’s area governs speech production – a different part of the brain which is further forward in the side of the left frontal lobe. It abuts the motor cortex that controls the jaw, larynx, tongue and lips, and appears to instruct these neighbouring parts of the motor cortex to articulate speech. People with damage to Broca’s area can understand what is said to them perfectly well, and they know what they want to say. They just cannot say it!

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<sup>15</sup> Cotterill, R. “Enchanted Looms: Conscious Networks in Brains and Computers”. Cambridge University Press, p. 388, 1998.

<sup>16</sup> Deacon, T. “Brain-language Coevolution”. In J.A. Hawkins & M. Gell-Mann eds. “The Evolution of Human Languages: Proceedings of the Santa Fe Institute Studies in the Sciences of Complexity”; San Francisco: Addison Wesley, 1990.

<sup>17</sup> Deacon, T. “Rethinking Mammalian Brain Evolution”. *American Zoologist*, 30, 629-705, 1990.

<sup>18</sup> Bates, E., Thal, D., & Marchman, V. “Symbols and Syntax: a Darwinian Approach to Language Development”. In N. Krasnegor, D. Rumbaugh, E. Schiefelbusch, & M. Studdert-Kennedy eds. “Biological and Behavioural Determinants of Language Development”. Hillsdale, NJ: Erlbaum, 1991.

<sup>19</sup> Sereno, M. “Language and the Primate Brain”. San Diego: California University Centre for Research in Language, 1990.

<sup>20</sup> Pinker, S. “The Language Instinct”. New York: Harper Collins, 1994.



## Reading<sup>21</sup>

Babies are tuned to hearing speech from birth, or even perhaps in uterus. Speaking also comes naturally to infants – provided they are exposed to *spoken* language during infancy. Therefore, even though language seems to be such a comparatively recent acquisition, the basics of hearing and speech previously must have been ‘hard wired’ into the brain to carry out procedurally similar cognitive functions, and as an essential precursor to the emergence of complex language<sup>22-23</sup>.

Whilst infants do not need to be taught the basics of hearing and speaking language, by contrast, reading and writing are far from being natural acquisitions and can only be learned by children after speech has been established. Printed text has only been widely available for a few hundred years, and therefore, on the evolutionary time scale, reading has had no time at all to even begin to become an innate ability. The only reasonable explanation is that we learn to read and produce written language by pressing into use the language system as evolved for speech, together with relevant parts of the visual and touch systems, e.g. object identification and gesturing systems (to use fine hand movements to manipulate a writing instrument).<sup>24</sup>

It is not surprising, then, that the areas dedicated to processing the written word are situated around the junctions between the areas given over to these different skills. Just behind Wernicke’s area lies a bulge called the angular gyrus, which seems to act as a bridge between the visual word recognition system and the rest of the language process. It is a region of the brain where vision, spatial skills and language appear to overlap on the margins of the occipital, parietal and temporal lobes<sup>25</sup>.

It is important to emphasize that the unnatural nature of reading and writing have serious implications in their use both to receive information (reading) and to express ourselves (writing). We do not write as we speak (especially in text books and academic journals). Therefore, how accurately does what we have (unnaturally) written represent what we would (naturally) have said? And what about the reader? Assuming the text being read does accurately represent what the writer intended, the reader has to, via a learned process (likely to be slow and inaccurate) convert that text into abstract mental models (either directly, if a speed reader, or using an additional sub-vocalisation step), and hope that those models accurately represent the writer’s intentions. Text has advantages, especially representing abstract concepts and details. But the cognitive scientific reasons why it is prone to slow information transfer, serious inaccuracies and poor retrieval need to be fully appreciated. Even for the literate people on this planet, in cognitive terms, text is the least efficient and effective of all available communications media.

## Memory

The only way that the brain can take in the data it needs to construct knowledge and behaviours is through the sensory perceptions that enter through the windows of the body’s five senses. Anything that a person does, perceives, thinks, or feels while acting in the world gets processed through complex systems of storage pathways<sup>26</sup> and creates memory.

The brain has 100 trillion connections joining billions of neurons and each junction has the potential to be part of a memory. So the memory capacity of a human brain is effectively infinite, providing it is stored in the right way<sup>27</sup>. The human memory is different from a computer’s in that it is selective. Items of interest – those that ultimately have some bearing on survival – are retained better than those that are not. So personal and meaningful memories can be held in their billions while learnt ‘dry facts’ (usually text-based) often quickly fade.

<sup>21</sup> Carter, R. “Mapping the Mind”. Phoenix, pp. 251-4, 1998.

<sup>22</sup> Cotterill, R. “Enchanted Looms: Conscious Networks in Brains and Computers”. Cambridge University Press, p. 388, 1998.

<sup>23</sup> Pinker, S. “The Language Instinct”. New York: Harper Collins, 1994.

<sup>24</sup> Kosslyn, S.M., & Koenig, O. “Wet Mind: the New Cognitive Neuroscience” (New York, Free Press, 1992)

<sup>25</sup> Carter, R. “Mapping the Mind”. Phoenix, pp. 254-8, 1998.

<sup>26</sup> Restak, R.M. “The Brain: The Last Frontier”. New York: Warner, 1980.

<sup>27</sup> Carter, R.; “Mapping the Mind”. Phoenix, pp. 288-9, 1998.

## What is Memory?

Although researchers are still not 100% sure how memory works, neuroscientists are making important discoveries in this area. Several models of memory exist, including the popular concept that our brains somehow record or ‘videotape’ life. This theory has its origins in reports that during surgery, electrical stimulation of the temporal lobe produced episodes of recall, almost like ‘seeing movie clips’. It persists even though such findings could not be replicated and have been dismissed by most experts!

Researchers generally agree that memory is not a fixed thing or singular skill, but rather is a process where a transient stimulus creates a persistent change in the brain. Our memories are not stored in a single location. Instead many distinct locations are implicated with certain memories (e.g. sound in the auditory cortex, learned skills in the basal ganglia, associative memory formulation in the cerebellum, etc.). Hence, a complex set of multiple memory locations and systems are responsible for our best learning and recall<sup>28</sup>.

The process for *retrieval* is proving to be much more consistent than is the location the memory was elicited from, and hence, this is providing a much better platform for understanding memory.

## Retrieval

There is no firm distinction between how well a person thinks and how well he or she remembers<sup>29</sup>. We can retrieve most of what we have paid attention to originally, but the success of that retrieval is highly dependant upon multiple factors, including state, time and content. For example, remarkable levels of recall have been demonstrated for Spanish<sup>30</sup>, mathematics<sup>31</sup>, city streets, locations, names, and faces when careful attention was paid to context and state. The variety of ways in which information is stored and retrieved indicates that our focus should move on from simple ‘memory’ to ‘which kind of memory and how it can be retrieved’<sup>32</sup>.

*Explicit/Declarative Memory.* This is formed in the hippocampus and stored in the medial temporal lobes. It comes in several forms, including the more word-based semantic memory and the event-type episodic memory:

- *Semantic Pathways:* Semantic memory is also known as explicit, factual, taxon, or linguistic memory, and includes names, facts, figures, and textbook information. It is word-based and is activated by association, similarities, or contrasts. The capacity limitations are more strongly influenced by the strength of associations made than the sheer quantity of items. We remember best in ‘chunks’, which are single thoughts, ideas, or groups of related ideas. A three-year-old can handle 1 chunk, which increases to 7 (+ or - 2) in people of 15 years and older. The brain does not appear to be well equipped to routinely retrieve this type of information, since humans have had little need for semantic recall until recent history when books and literacy became common. *Given the newness of this need, it is not surprising that this is by far the weakest of our retrieval systems.*
- *Episodic Pathways:* This system is also known as the loci, spatial, event, or contextual recall process – a thematic map of daily experiences. The visual system has both ‘what’ (content) and ‘where’ (location) pathways<sup>33</sup> (see Vision section), and *it is believed that this information is processed visually by the hippocampus...* Learning and memory are prompted by contextual cues, such as location and

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<sup>28</sup> Schacter, DL. “Understanding Implicit Memory”. *American Psychologist* 47, 4: 559-569, 1992.

<sup>29</sup> Turkington, C. “The Brain Encyclopaedia”. New York: Facts on File, 1996.

<sup>30</sup> Bahrack, HP. “Semantic Memory Content in Permastore: Fifty Years of Memory for Spanish Learned in School”. *Journal of Experimental Psychology*, 113: 1-29, 1984.

<sup>31</sup> Bahrack, H.P., & Hall, L.K. “Lifetime Maintenance of High School Mathematics Content”. *Journal of Experimental Psychology*, 120: 20-33, 1991.

<sup>32</sup> Jensen, E. “Teaching with the Brain in Mind”. Association for Supervision and Curriculum Development (ASCD) Publications, pp. 99-109, 1998.

<sup>33</sup> Kosslyn, S. “Wet Mind”. New York: Simon and Shuster, 1992.



circumstances. The formation of this natural memory is motivated by curiosity, novelty, and expectations, and is enhanced by intensified sensory input, such as sights, sounds, smells, taste, touch and emotions. Episodic memory has *unlimited capacity*, forms quickly, is easily updated, requires no practice, is effortless, and is used naturally by everyone.

- *Implicit memory*: Our minds are full of information, but our ability to recall it depends on which pathway we use to access it, and whether we realize that we know that information in the first place. Two distinct pathways are discussed here: procedural and reflexive.

- *Procedural Pathway*: This is often known as motor memory, body learning, or habit memory and involves both the basal ganglia and the cerebellum. Body and brain are not separate but are parts of the same contiguous organism, and what happens to the body happens to the brain. This dual stimulus creates a more detailed ‘map’ for the brain to use for storage and retrieval<sup>34</sup>. Such ‘hands-on learning’ creates a wider, more complex, and over-all greater source of sensory input to the brain than mere cognitive activity. It appears to have unlimited storage, requires minimal review, and needs little intrinsic motivation. At school, this type of learning diminishes each year until it is virtually absent (as in most tertiary courses). Yet, a summary of the research tells us that this learning is easier to master, is fairly well remembered, and creates lasting positive memories.

- *Reflexive Pathway*: Our reflexive retrieval system is automatic, almost permanently in use, and full of instant associations. Emotionally laden experiences receive privileged treatment and are more easily recalled than neural experiences. Auditory memories are potent emotional triggers — e.g. a favourite song. Researchers speculate that this stimulation takes separate pathways from the more mundane content-laden ones.

## Working Memory

A new term has recently emerged to describe how we juggle perceptions, memories and concepts: *working memory*. Memory used to be regarded as a simple library with a long-term store (childhood memories and so on) and a short-term store (a temporary holder in which information is retained for as long as it is needed, then discarded). As experimental techniques became refined, however, it has become clear that there is no rigid dividing line between a memory and a thought<sup>35</sup>. A range of related findings has led to the abandonment of the idea that a single short-term memory serves as the working memory. It has been replaced by a tripartite scheme which, according to the model of working memory developed by Alan Baddeley and his colleagues<sup>36</sup>, comprises a *central executive* and two subsidiary *slave systems*, as indicated in their highly schematic diagram.

*The Central Executive* is an attention-controlling system, probably located in the prefrontal cortex. It coordinates information from a number of sources, directs the ability to focus and switch attention, organizes incoming material and the retrieval of old memories. It marshals cyclic processes in the two slave temporary storage systems, namely the visuo-spatial sketchpad, and the phonological loop. These might each be a series of successively linked cortical clusters, their interactions being mediated by the forward and reverse projections that are common features of the cortex. Recent brain imaging studies at the Wellcome Department of Cognitive Neurology have found that the three parts are echoed precisely in the activity seen when people carry out cognitive tasks, and have confirmed the separate nature of visuo-spatial imagery and verbal repetition<sup>37</sup>:

- *The Visuo-spatial sketch pad* is responsible for setting up and manipulating visuo-spatial imagery, with further separation between *positional* (occipital lobe) and *pattern* (parietal lobe) processing in the

<sup>34</sup> Squire, L. “Memory and the Hippocampus: A Synthesis from Findings with Rats, Monkeys, and Humans”. *Psychological Review* 99, 2: 195-231, 1992.

<sup>35</sup> Baddeley, A.D. & Hitch, G.J. “Working Memory.” In GH Bower ed. “The Psychology of Learning and Motivation”, vol. 8, New York, Academic Press, 1974.

<sup>36</sup> Baddeley, A.D. “Working Memory”. *Science*, 255, 556-9, 1992.

<sup>37</sup> Cotterill, R. “Enchanted Looms: Conscious Networks in Brains and Computers”. Cambridge University Press, pp. 283-5, 1998.

visual domain. It is complex and remains poorly understood, although the four active regions so far identified by functional imaging are thought to represent ‘what’, ‘where’, executive control, and possibly image rehearsal.

- *The Phonological loop* maintains acoustic and speech-based information, and can be split into two components: a *phonological store* that holds a fast decaying (1 - 2 seconds) speech-based trace, and an *articulatory control mechanism* which plays a mediatory role, and which permits us to register visual information in the phonological store via sub-vocalisation. This store is thought to serve as a backup system for speech comprehension.

Working memory is best regarded as a mechanism that permits performance of complex cognitive tasks through its ability to temporarily store information related to the various sensory modalities, particularly those of vision and audition. It enables us to use our memory systems flexibly; to hold onto information by rehearsing it in our minds; to relate that information to older knowledge; and to plan our future actions. In Alan Baddeley’s view, working memory stands at the crossroads between memory, attention and perception, and as such, its role in human cognition and learning could hardly be more important.

## Natural Learning

### Brain Development and Early Learning

“For the first year or two of life outside the womb, our brains are in the most pliable, impressionable, and receptive state they will ever be in”<sup>38</sup>. We begin to be shaped as our immensely receptive brain/mind interacts with our early environment and interpersonal relationships. In part, there are predetermined sequences of development in childhood, including windows of opportunity for laying down the basic hardware necessary for later learning. Such opportunities are why new languages, as well as the arts, ought to be introduced to children very early in life.

Babies are tuned to speech from birth (perhaps even before). ‘Proper’ language starts in the second year with the activation of Wernicke’s area and Broca’s area<sup>39</sup> (see Sound section). Language comes naturally to children - provided they are exposed to it during infancy. But if they are deprived of the sound of speech, their brains may be physically disordered. All babies are born with the potential to speak any language and many languages, but if they are only exposed to a single tongue their options soon narrow because the neurological wiring needed to distinguish sounds atrophies if it is not stimulated in the first two years of life. Therefore, people who learn foreign languages as adults rarely speak them without an accent<sup>40</sup>. Indeed, second languages (learned later in life with much greater difficulty and poorer results) are processed in a different section of the language area than the mother tongue<sup>41</sup>.

Whether you want to call it a bioprogram or a Universal Grammar, learning the hardest aspects of language seems to be made easier by a childhood acquisitiveness that has a biological basis (like learning to walk upright). Perhaps, this acquisitiveness looks for intricate patterns in sound and sight and learns to mimic them. In many ways, this pattern-seeking bioprogram looks like an important underpinning for human levels of intelligence<sup>42</sup>.

This is supported by the fact that all people, from birth, also engage in a kind of scientific thinking. Natural selection shaped man to be intuitive physicists, biologists, engineers, psychologists, and mathematicians so that he could master his local environment<sup>43</sup>. However, it is important to distinguish these intuitive abilities from the modern, academic disciplines that most people find so hard to understand and learn.

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<sup>38</sup> Darling, D.J. “Zen Physics: The Sense of Death, the Logic of Reincarnation”. New York: Harper Collins, p. 18, 1996.

<sup>39</sup> Carter, R. “Mapping the Mind”. Phoenix, pp. 254-8, 1998.

<sup>40</sup> Oliver Sacks. “Seeing Voices”

<sup>41</sup> Kim, K.H.S., et al. “Distinct Cortical Areas Associated with Native and Second Languages”, *Letter to Nature*, 388: 6538 (1997), 171.

<sup>42</sup> Calvin, W.H. “How Brains Think”. Basic Books, p. 74, 1996.

<sup>43</sup> Pinker, S. “How the Mind Works”. Penguin, pp. 299-360, 1997.

For example, formal mathematics is an extension of the mathematical intuitions expressed by one week-old babies, who are aware when a scene changes from two to three items, or vice versa. Arithmetic grew out of our sense of number, and geometry out of our sense of shape and space. But, to assert that academic mathematics follows from our intuitive mathematics does not say that it follows easily.

According to psychologist George Miller, ‘the crowning intellectual accomplishment of the brain is the real world... All the fundamental aspects of the real world of our experience are adaptive interpretations of the really real world of physics’. Many cognitive scientists agree that the mind is equipped with innate intuitive modules which represent major ways of understanding the world. There are modules for objects and forces, for animate beings, for artefacts, for minds, and for natural kinds like animals, plants, and minerals. Although these different ways of knowing are innate, this does NOT mean that knowledge is innate. The concepts of innate modules help explain learning, they cannot minimize it. Beyond simply capturing experiences, learning requires a system for recording our experiences so that they generalize in useful ways.

## How Do We Learn

Learning is what the human brain does best. Scientists are unsure precisely *how* this happens, but they have some ideas of *what* happens<sup>44</sup>.

To our brain, we are either doing something we already know how to do, or we are doing something new (i.e. learning). Doing what we already know how to do is merely exercise, whilst doing something new is *stimulation*. As long as it is coherent, this novel mental or motor stimulation produces greater beneficial electrical energy than repetitive exercise. This input is converted to nervous impulses which travel to extraction and sorting stations like the thalamus, located in the middle of the brain. In intentional behaviour, a multisensory convergence takes place and a ‘map’ is quickly formed in the hippocampus<sup>45</sup>. From there, signals are distributed to specific areas of the brain (see Memory section).

Once this input is received, each neuron transmits an electro-chemical impulse (powered by the difference in concentration of sodium and potassium ions across the cell membrane), and resultant voltage changes stimulate the demand for dendritic growth. The process is repeated, via the synapse, to the next neuron, and so on. Eventually, the repeated electrical stimulation fosters neuron growth by way of dendritic branching. These branches lead to even more connections until, in some cases, whole, dedicated ‘neural forests’ help us understand better and, maybe someday, make us an expert in that topic. Hence, new dendrites and synapses usually appear in the effected parts of the cortex after quality learning.

Learning and memory are two sides of a coin to neuroscientists – i.e. the only evidence of learning is memory. Lasting learning, or long-term potentiation (LTP), has long been accepted as essential to the actual physical process of learning. Since its discovery in 1973 by Bliss and Lomo, countless experiments have defined its intricacies. Neurons change their receptivity to messages based on previous stimulation, i.e. the neurons have ‘learned’ and changed their behaviour. In short, our learning is achieved through the development of new dendrites and synapses, and the alteration of synaptic efficacy.

The daily chemistry of our brain adds great complexity to the question, ‘how does our brain learn?’. Neurotransmitters (e.g. glutamate, GABA, ...) act as ‘cellular phones’ offering specific communications between synapses, whereas the other chemicals (e.g. serotonin, dopamine, noradrenaline, ...) act more like ‘loudspeakers’ that can broadcast to wide areas of the brain. The latter produce observable behaviours such as attention, stress, or drowsiness. In short, learning happens on many complex levels simultaneously.

<sup>44</sup> Jensen, E. “Teaching with the Brain in Mind”. Association for Supervision and Curriculum Development (ASCD) Publications, pp. 13-16, 1998.

<sup>45</sup> Freeman, W. “Societies of Brains”. Hillsdale, NJ: Lawrence Erlbaum and Associates, 1995.

## Improving Learning and Intelligence

The end result of learning for humans is intelligence. The key to getting smarter is not having a bigger brain or more brain cells per cc. but is growing more dendrites and synaptic connections between neurons as well as not losing existing connections. It is these connections that enable us to solve problems and figure things out (i.e. act intelligently and learn).

The brain is ‘plastic’, which means that much of its hard wiring can be changed by an individual’s experiences. Research shows that complex learning is enhanced by challenge and inhibited by threat. The mind learns optimally when it is appropriately challenged in an environment that encourages taking risks. Under these circumstances, rat brains make maximum connections in the areas where learning is taking place by their neurons growing large numbers of new dendrites and synapses within a few hours. Conversely, the mind appears to ‘down-shifts’ under perceived threat. Under threat, rat brains reduce connections by their neurons losing significant numbers of dendrites and synapses within a few days. The mind then becomes less flexible and reverts to primitive attitudes and procedures. Low threat, however, is NOT synonymous with simply ‘feeling good’. The essential element of perceived threat is a feeling of helplessness or fatigue. Occasional stress and anxiety are inevitable and are to be expected in genuine learning. The reason is that genuine learning involves changes that lead to a reorganization of the self. Such learning can be intrinsically stressful, irrespective of the skill of, and support offered by a teacher.

Although each of our 100 billion neurons ordinarily connects with between 1,000 and 10,000 other neurons, theoretically, they could connect with far more. Hobson has calculated that a normal brain could be capable of processing as much as  $10^{27}$  bits of data per second<sup>46</sup>. Some estimate that we use much less than 1% of our brain’s projected processing capacity. Whatever the case, the brain’s architecture has the inherent capacity for every individual to significantly increase their intelligence!

## Individuals, Society and the Learning Process

Learning is significantly influenced by the nature of the society within which people are existing. Vygotsky emphasized the social construction of knowledge<sup>47</sup>, and it is now generally accepted that throughout our lives, our minds change in response to their engagement with others. Hence, individuals, their identities and their learning, should be seen to be integral parts of larger social systems.

But every individual’s mind inherits the lifelong drive to ‘search for meaning’ (i.e. the passion to learn). This search for meaning tries to make sense of our experiences, is survival-oriented, and at its core, is driven by the individual’s purposes and values. The range of human purposes and values, and their strong relationship to differing social systems was discussed by Maslow<sup>48</sup>. Thus, the search for meaning ranges from the need to eat and find safety, through the development of relationships and a sense of identity, to an exploration of our potential and the quest for transcendence<sup>49</sup>.

Most societies place a high value on learning. Yet, their emphasis is on the ‘measurable’ results of learning, whilst the crucial, but more complex processes of learning tend to be down-played. What ensures our survival is using our highly effective and adaptive minds to adapt and create options. Humans have survived for thousands of years by trying out new things, usually in small groups, NOT by always getting the ‘right’, tried-and-true answer — that’s not healthy for growing a smart, adaptive mind.

This raises important questions regarding the appropriateness of a variety of combinations of individual or group learning in independent or interactive modes:

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<sup>46</sup> Hobson, J.A. “Chemistry of Conscious States”. Boston, Mass.: Little, Brown and Co. 1994.

<sup>47</sup> Vygotsky, L.S. “Mind in Society”. Cambridge, Mass: Harvard University Press, 1978.

<sup>48</sup> Maslow, A.H. “Toward a Psychology of Being”. 2nd ed. New York: D. Van Nostrand Company, 1968.

<sup>49</sup> Caine, R.N. & Caine, G. “Education on the Edge of Possibility”. ASCD Publications, pp. 104-8, 1997.

- When is independent learning most effective (just the learner and the learning material)?
- When is individual tutoring most effective (just the learner, the tutor, and the learning material)?
- When is group learning most effective (small groups (2-5) of learners actively interacting with each other, the learning material, and perhaps a tutor/facilitator)?
- When is classroom/lecture theatre instruction most effective (large groups (15-400) of learners passively being instructed by a single teacher/lecturer)?

## **Part II THE GLOBAL APPROACH TO TEACHING AND LEARNING**

### **The Need for Fundamental Change**

The educational model that evolved during both the hunter-gatherer and agrarian periods of early human history was uncomplicated – an individual learned by becoming an apprentice to someone (usually within the same community) who was significantly more skilled and knowledgeable in that area.

But the Industrial Revolution fostered a new model, developed in the 1800s, which brought everyone together in a single place and offered a standardized, ‘conveyor belt’ curriculum. This paradigm of education (the ‘factory model’) became the global norm in the 20th century, and drew from fields of sociology, business, and religion, emphasizing obedience, orderliness, unity, and respect for authority. The emergence and dominance of behaviourism in the mid 20th Century only served to reinforce the ‘reward and punishment’ emphasis that had grown to characterize the factory model.

However, the recent emergence of neuroscience, an exciting interdisciplinary approach to non-invasive brain research, is providing an ever-growing wealth of major insights which are challenging many conventional educational beliefs, most of which have been entrenched in the current ‘factory model’. Brain scanning devices like functional magnetic resonance imaging (fMRI) and positron emission tomography (PET), enable us to analyse the living human brain whilst its owner was carrying out a wide variety of cognitive activities, including learning. During the ‘90s, (the decade of the brain), interdisciplinary brain research involved a growing number of sub-disciplines, e.g. genetics, physics, and pharmacology<sup>50</sup>.

Although to date we have hardly scratched the surface of understanding the most complex device on the planet, a coherent, preliminary model of how the brain works is emerging (as summarized in the first section) which makes it clear that significant changes are needed both in the ways we teach, and the ways we enable people to learn. A great deal of action research remains to be done, remembering that most paradigm changing breakthroughs have been caused by ‘outside-the-box’, multidisciplinary insights. This section discusses some of the actions that can and should be taken.

### **Improving Teaching and Learning**

Historically, the ‘factory’ model of education was seen as an environment where knowledge was a commodity that teachers could dispense. New models are emerging where learners construct their knowledge through their own activity and experience, forming and revising their beliefs about the world.

In a rapidly changing society, we cannot teach people all the facts they will need to know in their lifetime. But we can teach them how to assess their knowledge state, how to find out things for themselves, and how to

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<sup>50</sup> Jensen, E. “Teaching with the Brain in Mind”. Association for Supervision and Curriculum Development (ASCD) Publications, pp. 1- 6, 1998.

evaluate conflicting sources of information. The emphasis in modern learning must move from the memorization of facts to the acquisition of cognitive skills – thinking, learning, and reasoning. Once the focus shifts, the learner’s understanding (or theory) of mind becomes important<sup>51</sup>. Modern pedagogy is adopting the view that learners should be aware of their own thought processes, and that it is crucial for the pedagogical theorist and teacher alike to help them become more metacognitive – to be as aware of how they learn and think as they are about the study material<sup>52</sup>. Researchers have made strong claims regarding the importance of ‘theory of mind’ development for learning.

Theory of mind understanding is also linked to the development of scientific reasoning and critical thinking which depend upon the ability to reflect on one’s own beliefs, to recognise where they are mistaken, and to take another’s perspective. Learners need an appropriate metacognitive language to discuss literary and historical characters’ motivations, to evaluate evidence, and to test scientific hypotheses.

With so much explicit knowledge about how the brain works and with data so clearly supportive of the fact that students construct knowledge for themselves, educators must be persuaded to change from overusing passive-learner instructional methods, such as show-and-tell teaching, to using more thoughtful learning methods, i.e.:

- Learners construct understanding for themselves.
- To understand is to know relationships.
- Knowing relationships depends on having prior knowledge<sup>53</sup>.

In this context, examples of potential areas for major improvements to teaching and learning include:

*Section 1 showed that there are many possible avenues for input and learning in the human mind, yet the dominant show-and-tell teaching methods, such as lectures, demonstrations, and textbook narratives, activate only a few of them.*

Enriched learning environments need to be created that involve learners in a variety of inquiries within *rich content contexts*, thus increasing the likelihood that knowledge and thinking capabilities will be improved. Whenever bits of information are isolated from these rich contexts, they are usually forgotten and become inaccessible to memory<sup>54</sup>. Because the mind resists having meaninglessness imposed on it, effective education must give learners an opportunity to formulate their own contextualized patterns of understanding.

*Written formats, such as textbooks, give minimal help because symbols are not reality. They cannot be acted upon or manipulated. Understanding what a symbol represents depends on prior experiential knowledge related to the symbol.*

Learning environments allowing a rich variety of *quality hands-on experiences* need to be created within which *learners may choose, explore, manipulate, test, and make transformations* within the ‘objects and ideas’ environment provided. These contribute significantly to stimulating learners’ interests and linking their perceptions stored within the brain, involving both newly acquired and prior knowledge.

*Even for the vast majority of literate people on this planet, in cognitive terms, text is the least efficient and effective of all the available communications media.*

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<sup>51</sup> Astington, J.W. “Theory of Mind Goes to School”; in ‘How the Brain Learns’, Educational Leadership, ASCD, vol. 56, no 3, pp. 46-8, 1998.

<sup>52</sup> Bruner, J. “The Culture of Education”. Cambridge, MA: Harvard University Press, p. 64, 1996.

<sup>53</sup> Lowery, L. “How New Science Curriculums Reflect Brain Research”; in “How the Brain Learns”, Educational Leadership, ASCD, vol. 56, no 3, pp. 26-30, 1998.

<sup>54</sup> Cowley, G. & Underwood, A. “Memory”. Newsweek, 131(24), 48-9, 51-4. June, 1998.



Pedagogists and educators should be alerted to the unnatural nature of text, and its ineffectiveness for most aspects of learning. Alternative, *more appropriate delivery and communications media* should be employed.

*Complex learning is enhanced by challenge and inhibited by threat.*

For optimal learning, educators need to create and maintain an *atmosphere of relaxed alertness, involving low threat and high challenge*. Low threat, however, is NOT synonymous with simply ‘feeling good’. The essential element of perceived threat is a feeling of helplessness or fatigue.

*The brain is highly complex and adaptive. Educators who employ singular approaches and narrow, standardized tests to get the ‘right’ answers are neglecting the adaptive power of the developing brain. They are focussing on the measurement of learning, rather than the process of learning.*

Good quality learning environments encourages the exploration of *alternative thinking, multiple answers, and creative insights* by learners.

*Without an understanding of what the mind was designed to do in the environment in which we evolved, the unnatural activity called formal education is unlikely to succeed.*

We need to know a great deal more about the innate component of each human ability, and the most appropriate stage in the development of the brain for it to be built upon and mastered. And we need to *take notice of what is already known*. For example, the dominant technique in American reading instruction, called ‘whole language’, is based on the erroneous deduction that since spoken language is a naturally developing human instinct, so is *reading*. As explained in Part 1, reading is NOT innate, and must be taught via the ‘old-fashioned’ method of practice at connecting letters to sounds. Instead, children are immersed in a text-rich social environment to encourage the innate ability of reading to manifest itself. But the children simply don’t learn to read<sup>55</sup>! Understanding how the mind learns does not eliminate hard work and practice, but should ensure that they are used only when appropriate (and they can still be fun).

## Improving Memory and Retrieval

Certainly, there is more to a better education than memory. Although the emphasis is moving away from rote memorization of volumes of material (perhaps less obviously at the tertiary levels in science, medicine, and law), it will continue to be a critical skill. For example, there are clear links between memory skills, better self-esteem, and academic achievement. By breaking apart all of the ways we learn, rehearse, and assess, and by using the right system in the right way, learners can consistently experience better recall. Therefore, educators have an obligation to share with learners a better understanding of memory, and the related retrieval strategies<sup>56</sup>.

Before looking at each type of retrieval in more detail, it must be emphasized that meaningful learning generally occurs through combinations of different approaches to memory. Evolution has supplied us biologically with the capacity to register complex experiences, and information is organized and stored differently depending on whether it is meaningful or meaningless to the learner (not the teacher!). Without exception, we remember material best when it is structured and meaningful. *Teaching the whole before the parts ensures better recall*, whichever type of retrieval is involved. The mind recalls best with context, a global understanding, and complete pictures to remember. Once learners understand the relevance and overall themes, the details and deeper studying makes more sense.

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<sup>55</sup> Pinker, S. “How the Mind Works”. Penguin, p. 342, 1997.

<sup>56</sup> Jensen, E. “Teaching with the Brain in Mind”. Association for Supervision and Curriculum Development (ASCD) Publications, pp. 109-12, 1998.



*Explicit/Declarative Memory Strategies:*• *Semantic Memory:*

Text-based learning material dominates the global education system – ‘book learning’ is a preferred mode for most teachers for many reasons. But learners seldom find semantic learning interesting. Research shows that names, facts, figures, and textbook information seem to frustrate them the most. Much semantic learning proves to be unretrievable for a variety of reasons, e.g. the original learning was out of context, trivial, too complex, lacked relevance, or lacked sufficient sensory stimulation. Teachers requiring large amounts of recall from texts are, at best, developing self-discipline in the learners. At worst, they are creating discouraged learners who feel unnecessarily incompetent. *This is, in fact, the weakest of the mind’s retrieval systems, and there is growing concern that it is so dominant in the education system.*

Because of its weakness, this type of memory requires strong intrinsic motivation, and its retrieval requires effective activation via such prompts as visualization, mnemonics, music, and discussion. Ways to improve semantic retrieval include:

- Novelty is known to improve recall dramatically.
- Semantic memory particularly needs time for quiet processing and reflection, otherwise little is transferred to long-term memory. Keeping ‘chunks’ to a minimum helps the working memory.
- Mind-maps and other graphic organizers have established significant value by drawing, organizing, or symbolizing key points.
- More visually effective contexts have high impact, e.g. illustrations featuring strong colours; cartoon-like story-boards of key ideas.
- Studies show that analysis of semantic material, particularly in group discussions, aids its recall<sup>57</sup>.
- Recall improves when material is repeatedly reorganized and reviewed from various points of view.

• *Episodic memory:*

Episodic processing (loci, spatial, event, or contextual) has *unlimited capacity*, forms quickly, is easily updated, requires no practice, is effortless, and is used naturally by everyone. There is ample evidence that learners’ recall improves when the learning involves location and/or context changes, e.g. a field trip, music, a guest speaker, or a novel learning location. Ideally, concepts should be learned in different, relevant locations, yet the dominant mechanism is to introduce new concepts in the same location, i.e. months of learning in the same classroom/lecture theatre seat. Physical location changes should be used more frequently, despite the additional administrative load. However, an additional way to take advantage of the power of episodic processing now exists by using technology to introduce appropriate *virtual* location and context changes.

• *Implicit Memory Strategies:*

Learners often know more than they realize, but tend to favour a subset of available pathways for retrieval, which are often inappropriate. They need to broaden their range, including the following implicit memory strategies.

• *Procedural:*

Known as motor memory, body learning, or habit memory, such ‘hands-on learning’ creates a wider, more complex, and over-all greater source of sensory input to the brain than mere cognitive activity. A summary of the research confirms that this learning has unlimited storage, requires minimal review, is easier to master, and creates lasting positive memories. Unfortunately, in formal education environments (especially secondary and tertiary) this type of learning diminishes each year until it is virtually absent.

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<sup>57</sup> Matthews, R.C. “Semantic Judgements as Encoding Operations: The Effects of Attention to Particular Semantic Categories on the Usefulness of Interim Relations in Recall”. *Journal of Experimental Psychology: Human Learning and Memory* 3, 8: 160-173, 1977.

- *Reflexive Strategies:*

This type of learning is automatic, almost permanently in use, and full of instant associations, and is brought into play the more learners practice. Although repetitive practice is inappropriate in many areas (especially where innate abilities exist), reflexive recall is powerful, and can be enhanced by games and other quick reaction activities.

### Improving Working Memory

Working memory is of crucial importance (especially to learning) as the mechanism that permits performance of complex cognitive tasks through its ability to temporarily store information related to the various sensory modalities, *particularly those of vision and audition*. It enables us to:

- use our memory systems flexibly;
- hold onto information by rehearsing it in our minds;
- relate that information to older knowledge;
- plan our future actions.

The current dominant ‘show-and-tell’ teaching methods do not take into account the strengths and weaknesses of this ‘rate limiting’ system. For example, each of the two slave temporary storage systems, (i.e. the visuo-spatial sketchpad, and the phonological loop), can hold limited numbers of ‘chunks’ of information (7 + or - 2), BUT their ability to do this is independent (i.e. both can hold 7 chunks simultaneously). Yet ‘show-and-tell’ inevitably overloads the phonological loop, whilst underutilizing the visuo-spatial sketchpad. This is particularly concerning when it is realized that the visuo-spatial sketchpad is by far the senior partner, since language has been acquired in the last few 10,000s of years (a second in evolutionary time scales), whereas vision has been and remains man’s (and primate’s) senior sense for 60 million years.

### The Role of Text

We have seen how complex a challenge it is for the human mind to detect and interpret language, and that it is still in the process of evolving to best cope with this valuable emerging unique human ability. Reading is very more recent, and much more of a processing challenge. However, seeing, and identifying the code (letters and words) that make up written language are far from being a challenge to our visual perception (we have shown how the further interpretation and processing of the visually detected code happens in the language centres, not the visual cortex). Employing the amazing power of our primary sense organ (almost 50% of the cerebral cortex) for hours to detect this small selection of stationary, repetitive, symbols is not like using a Rolls Royce to fetch food from the corner store. Worse, it is like repeatedly using an articulated lorry to fetch food from the corner store, bringing back just a few items at a time (due to the sequential nature of text). Some claim that ‘speed-reading’ utilizes more of our visual power, but many who attempt to acquire this skill fail, whilst there is little sign of it being taught in primary schools.

So how and why did text acquire this dominant role in our lives? Cultural critic Marshall McLuhan points to Gutenberg’s invention of movable type as the force behind a vast array of cultural effects. His major message was that societies and cultures are more shaped by the nature of their communication media, than by the content. According to John Culkin, one of Marshall McLuhan’s major interpreters<sup>58</sup>,

*“The alphabet is a funnel. All sense data must henceforth be squeezed into and through the narrow passage of print. The audible, the pictorial, the tactile, the olfactory - all get translated into ... the abstract... Reality is squeezed through the funnel of the alphabet. Reality comes out one drop at a time; it is segmented and sequential; it is fragmented along a straight line; it is analytic; it is abridged; it is reduced to one sense; it becomes susceptible to perspective and point of view; it becomes uniform and repeatable.”*

<sup>58</sup> Culkin, J. “Each Culture Develops its Own Sense-Ratio to Meet the Demands of its Environment”. In “McLuhan: Hot and Cool”, GE Stearn ed, 42-43, New York: dial, 1967.

Certainly, the alphabet, text, and Gutenberg's movable type must rank amongst man's most impressive and important achievements. But a wonderful tool appears to have become a tyrannical master for the majority of the people on the planet. Is the problem with text, or with the ways society has grown to use it? Horn argues that the current split and imbalance between using words and using images (exemplified in the education system) parallels a historical split<sup>59</sup>. Just after the invention of the Phoenician alphabet, words and images (artistic pictures, sculptures, drawings) began to take separate routes, becoming separate forms of communication. Each had its own vocabulary and syntax, each its own tools and concepts. Each had its own master craftsmen and teachers, each its own department in the university. Even in the elementary grades, teachers specialised in one subject or the other, seldom both. In school, everybody knew that you were either a word person or a picture person. It was all part of the great either/or division that our societies have relied upon for millennia.

It is natural that most of the people reading this article will disagree (probably very strongly) that text has so many problems associated with it. They will point out (quite rightly) that text has been a primary factor in their reaching the status that they currently have in society (usually in the top 25%). Once they had learned to read (and how many of us can remember how easy/difficult this was?) text-based material proved an invaluable resource in the many ways they continued to learn and grow (books, newspapers, journals, reports, e-mails, web-sites, etc.), as well as the many ways they learned to express themselves (letters, e-mails, reports, articles, books). The point is that these people are us, and we are *'text-o-philes'*, who CAN read, enjoy reading, and have easy access to reports like this.

If we, text-o-philes, represent a significant majority of the people on this planet, then the problems with text spelled out above should still be addressed, but as important peripheral initiatives, rather than as a primary focus of the global education sector. But we are NOT the majority! The vast majority of the people on this planet will NEVER read this report (or any other similar document) for a variety of reasons:

- it is so badly written;
- they can't read;
- they don't understand English;
- they don't have access (either in print or electronic form);
- even though they have been taught to read, they don't because it is so difficult for them; they are slow at reading; their understanding is poor; and their recall is even poorer. Let's call these people *'text-o-phobes'*.

We will return to the issues around illiteracy, imposed languages, and the lack of access in the final section dealing with the developing world, since text does not appear to be the primary cause of these problems. As for improving this author's writing style, this has proved a hopeless task!

How serious a problem is 'text-o-phobia' in the developed world, where almost everyone is taught to read early in life, and has the opportunity to access a wide range of material in their natural language(s)? We can't answer this question with unequivocal statistics, since 'text-o-phobia' is not a recognized condition, but there are some strong pointers. Why does *Functional Illiteracy* remain a major problem in the developed world? As the World's most affluent society, the USA has been pumping \$ billions into its education system for decades. Yet, according to Manuel Castells, over 40 million adults in the USA in 1997 (>25% of the adult population) had 'blatantly insufficient levels of reading and writing in English, as well as of elementary arithmetic'<sup>60</sup>.

The importance of literacy and higher levels of language skills in modern society can hardly be exaggerated. People are judged on how they write and speak and, as we have seen, nearly all academic teaching is dominated by language ('text-and-tell'). Therefore, since it has become such a fundamental, cross-cutting tool, anyone who is not 100% proficient in reading and writing is likely to be seen as deficient across a whole range of skills<sup>61</sup>.

How many people in modern developed societies are "100% proficient in reading and writing"? At the other extreme are people with dyslexia, who have a history of being severely discriminated against, and treated as if

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<sup>59</sup> Horn, R.E. "Visual Language: Global Communication for the 21st Century". MacroVU Inc., Washington, p. 2, 1998.

<sup>60</sup> Castells, M. "The Information Age: Economy, Society, and Culture", vol. 3, "End of Millenium", Blackwell, p. 163, 1998.

<sup>61</sup> Carter, R. "Mapping the Mind". Phoenix, pp. 251-4, 1998.

having little intelligence. Dyslexia takes many different forms and probably has many different causes. However, PET brain scans of dyslexic people doing word tasks have shown that, unlike in non-dyslexic people, their language processing areas fail to work in concert, so the incoming words get jumbled up and disjointed. The insula (the deep infold that lies between the language areas, and which appears to orchestrate their activity in non-dyslexic people) did not fire and each language area was activated singly.<sup>62</sup> It must be stressed that this dysfunction of a small area of the brain is NOT an inherited flaw, but a failure to fully develop an unnatural skill.

Learning to read (and write) is no more natural than, but equally as complex and difficult as, learning to play a musical instrument like the piano or the violin. How do you get to Carnegie Hall? Practice! But no matter how hard we practice, only a special few of us will develop the exquisite skills that get us to Carnegie Hall. A larger minority will be good enough to please themselves and others (tutors, pub pianists), many more of us (the majority?) can get to the level of ‘banging out a tune’ which is fun for 2 minutes, but becomes hugely painful for any audience for longer periods. And then there are those (>25%?) who no matter how long or hard they practice have brain structures that cannot master just one of the many steps in the relevant combination of skills, including the ‘tone deaf’ (the musical equivalents of illiteracy and/or dyslexia?).

Although it is sad to discover that one cannot play the piano, no one uses that inability as a measure of one’s lack of intelligence, or as a basis for discrimination. So why does society (and especially the education sector) do exactly that with reading (and writing)? Isn’t it because of the unfortunate, but widely held misconception that because we ARE all born with the innate ability to develop exquisite language skills (speech and hearing), we must also be born with similar innate skills for reading and writing?

To return to the range of skills in the music analogy, how meaningful is an IQ test, or how fair is any form of written examination when to a large extent what we are fundamentally remeasuring is the very wide range of abilities in the general population to read and write? Doesn’t the incorrect assumption that we are all born with the ability to develop similarly high levels of reading and writing skills (whereas very few of us can ever get past the level of being able to ‘bang out a tune’) mean that as long as we leave text in its dominant role in our global education system, that system can NEVER be equitable, even in the developed world?

This is not a plea for the banning of text! It is a plea to reexamine the role of text in the light of our knowledge of how the brain works, and to replace its current dominance with a more balanced role where its strengths are accentuated, and its weaknesses avoided. The power of text rests in the author’s ability to enrich and extend the ideas already within a reader’s mind. New knowledge gained from reading is actually a rearrangement of prior knowledge into new connections. With something to work with, an author can help readers understand abstract ideas that they could never experience firsthand. But if readers have little in storage related to the content of what they read, they will gain little from reading.

Great fiction writers (who have an exquisite skill analogous, perhaps, to the playing skills of, say, Rachmaninov) can rearrange what most of us know with such craft and sensitivity that it gives great pleasure, as well as new insights. They have the rare ability to excite our imaginations, and energize our ‘mind’s eye’ to create intoxicating new worlds. They appreciate the abstract and vague nature of text, and realize that each reader’s ‘new world’ that the text stimulates them to imagine may be dramatically different from one reader to the next. Their genius is that they don’t use text as a control mechanism (as we MUST do when educating), but as a stimulant to set the reader’s imagination free. They DO control the story line, but the imagined world created is the readers’.

Sadly, we can’t use text this way in education, even if it were possible to raise every educational writer to the level of, say, Wilbur Smith. In almost all subjects, education is not in the business of conjuring up imagined worlds, but of attempting to accurately describe and explain to learners REAL worlds (contexts, concepts) that many of them have not seen, and may never see. However, the more academically accurate the writer tries to make text, the more detailed it needs to be, the longer it becomes, the dryer it becomes, the less interesting it becomes, the less memorable it becomes, and the more difficult it becomes to write! This is not what text is good for – it is unfair to learners, to writers, and to text itself!

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<sup>62</sup> Paulesu, F., Frith, U. et al. “Is Developmental Dislexia a Disconnection Syndrom?”, *Brain*, 119 (1996), 143-7.

## The Role of Technology

Technology has been used in education for centuries. Chalk is technology, a book is technology. However, what we are emphasizing here is Information and Communications Technology (ICT). The arrival of personal computers (PCs) a quarter of a century ago turned everyone (theoretically) into a potential computer user. In the 80s and 90s, the PC/Internet combination converted the Internet from a tool used by some military and academic cliques into a global phenomenon which, in turn, has changed the nature of the PC (and its most popular applications) from being predominantly a processing tool into a powerful and highly flexible communications platform.

In the context of the PC/Internet combination three powerful trends can be identified that are driving the information revolution:

- **Cost of communicating:** The transmission cost of sending digital data has decreased by more than a factor of 10,000 since 1975.
- **Power of computing:** Computing power per dollar invested has also increased by well over a factor of 10,000 since 1975.
- **Convergence:** Analogue technologies are being replaced with digital technologies which are capable of dealing with voice, video and computer data over the same network.

## Using Technology in Existing Learning Environments

Put simplistically ICTs can be used directly to improve teaching in two ways: via the delivery of teaching, and to create better teaching materials. However, both of these have many sub-components, and the picture is further complicated by the mode of teaching, i.e. contact, distance or a combination of both.

Two concepts are frequently used in this area. Although they overlap, there are significant differences, and therefore they should not be confused with each other:

- *Technology-mediated distance education:* This has long been used to increase the range of the traditional contact mode of teaching, often via broadcast media. The synchronous form uses TV, radio, and video-and tele-conferencing, whereas the asynchronous form uses video- and audio-tapes via TV and radio, and more recently via the web. Here the pedagogy is fixed, i.e. the traditional contact or 'show-and-tell' mode.
- *Technology-enhanced teaching:* This first emerged in the 70s as text-based computer-based education (CBE) and computer-based training (CBT). More recently, a wide range of improvements to current learning materials has become possible via the application of interactive digital multimedia: text, graphic, audio, video, animation, simulation, virtual reality, etc.; and via the asynchronous delivery of digital material, whether in a contact institution or in distance mode. Here, the pedagogy is often assumed to be contact, but a wide range of more appropriate alternatives are possible. This is the area we are addressing in this article.

Most residential higher education institutions (HEIs), and a few of the best funded schools have been experimenting for some time with both types of enhancement. The most strategic has been the adoption of broadcast mechanisms to provide lectures (usually live) at a distance, thereby reaching thousands more students at satellite campuses and other delivery sites. Less strategic has been the adoption by lecturers (individual and groups) of one or more aspects of ICT-enhanced teaching, often to supplement their lecture material (verbal and textual).

The advent of the World Wide Web (web) is further complicating the above already complex picture. The web allows any learning material, once digitized (e.g. text, graphics, voice, video, animation, etc.) to be made available anywhere in the world that has Internet connectivity, either synchronously or asynchronously. It should be emphasized that the web has introduced the additional major attribute of several levels of *interactivity*, both synchronous and asynchronous, ranging from e-mail and 'chat rooms', through interactive learning environments (taking much from the latest web-based multi-user games, and including virtual reality), to voice and/or video conferencing over IP.



Of course, availability of bandwidth and PCs with sufficient power at access points currently imposes a variety of restrictions on what can be received by whom, when and where. But the technology exists to enable us to develop a wide variety of improvements to our teaching materials and the ways in which it might best be delivered to a variety of learners (which go together to create the learning experience). The restrictions come from a combination of education sector 'traditionalism', fuzzy political vision, and private sector indifference. Technology is often used unfairly as the scapegoat for inaction in this complex, but exciting field of opportunity.

There are a growing number of schools and colleges where all learners have access to computers, and the trend in the developed world is to aim for every student having his/her own PC or Notebook. These learners are provided with learning programmes by the institutions, and can also search the web for a wide range of digitized material that is available. However, most of this material is either text-based learning material that has been digitized, or has been developed to 'push' a particular application of ICTs, rather than enhanced pedagogy.

More and more teachers are using PCs or notebooks (sometimes with a digital projector) to enhance their study material. However, full ICT literacy is a problem with many of the older teachers (ICT appears to be one of the areas where young minds are much better adapted to learn). In most cases, these teachers are not developing technology-enhanced new learning material (and do any of them have the time and resources to do so?), but are using ICTs to overcome the fact that semantic memory (names, facts, numbers, and textbook information) is the weakest of the mind's retrieval systems. Instead of redesigning the text-based material, they enhance its retrieval via such prompts as mnemonics, music, novelty, discussion, and visualization tools (e.g. mind-maps – drawing, organizing, or symbolizing key points).

### Using Technology to Create New Learning Material

As we create new technology-enhanced learning materials, it must be recognized that we are only at the beginning of a long and exciting global initiative. It must not be technology that drives this development, but improved pedagogy based on our growing understanding of how the human brain/mind learns. Over the next two decades we will discover a great deal more about the innate component of each human ability, as well as the most appropriate stage in the development of the brain for it to be built upon and mastered. However, *if we take notice of what is already known*, as set out in section 1, there is a great deal we can already be doing.

We have established that the new learning material needs to break out of the current show-and-tell mode, and the related dominance of text-based material, because:

- they activate only a few of many possible avenues for input and learning in the human mind;
- written formats, such as textbooks, cannot be acted upon or manipulated;
- for learning purposes, text is the least efficient and effective of all the communications media that technology now make easily available;
- singular approaches and narrow, standardized tests to get the 'right' answers are neglecting the adaptive power of the developing mind/brain;
- semantic memory (names, facts, numbers, and textbook information) is by far the weakest of the mind's retrieval systems;
- the power of the more natural episodic, procedural, and reflexive learning and retrieval systems are mostly neglected;
- they do not take into account the strengths and weaknesses of the crucially important, but 'rate limiting' working memory system. 'Show-and-tell' inevitably overloads the phonological loop, whilst underutilizing the much better established visuo-spatial sketchpad.

What are the guidelines for building the new, technology-enhanced learning environments?

Firstly, the material must be structured, meaningful and coherent. *Teaching the whole before the parts ensures better learning and recall*. The mind learns and recalls best with context, a global understanding, and complete pictures to process. Once learners understand the relevance and overall themes, the details and deeper studying makes more sense, and help the learner to build a rich network of additional associations and relationships (contextualized patterns of understanding) on an ongoing basis. Such material begins to take advantage of the power and unlimited capacity of episodic processing. Historically, it has been very difficult to paint such big

pictures in the classroom or lecture theatre other than descriptively. But now, ICTs can be used to introduce appropriate *virtual* location and context changes drawn from what will become an almost infinite resource of real and abstract digital worlds.

Secondly, within the above holistic content contexts, enriched learning environments need to be created that involve learners in a variety of inquiries which much more fully *utilize the many possible avenues for input and learning in the human mind*. This increases the likelihood that the learner's knowledge and thinking capabilities will be improved, and also employs the power of episodic processing. Although one-on-one tutorials, and small learning groups often, quite naturally, use this powerful learning regime, it cannot be properly set up or utilized in the classroom containing from 25 to 400 learners. However, modern ICTs can be used to create a variety of multimedia-based digital learning avenues, with the additional power of allowing the learner to select whichever avenue he/she prefers at any particular time.

Thirdly, the effectiveness of these new learning environments will be greatly enhanced by providing *a wide variety of quality hands-on experiences* which encourage learners to choose, explore, manipulate, test, and make transformations within the 'objects and ideas' environment provided. Again, episodic processing is likely to be involved, but in addition, both the procedural and reflexive components of implicit memory are particularly employed. Specialised physical environments (e.g. laboratories) exist which, in part, address this need which cannot be addressed in the normal large classroom or lecture theatre. But these physical environments can only be made available to sub-sets of learners for short periods, and are costly, requiring significant set up costs, as well as ongoing maintenance and support. Alternatively, ICTs can now be used to establish interactive virtual learning environments which can stimulate a much larger number of learners, with the added advantages of safety and low maintenance overheads.

By employing the full potential of ICTs as introduced above, these new learning environments can at last be built to:

- encourage the exploration of alternative thinking, multiple answers, and creative insights by learners;
- establish a much more balanced use of working memory, by reducing the use (and overload) of the phonological loop, whilst fully utilizing the more powerful visuo-spatial sketchpad;
- use more appropriate delivery and communications media as required, not just 'text-and-tell';
- create highly challenging experiences for the learners, thereby reducing the stressful atmosphere of perceived threat, and feelings of helplessness or fatigue so often experienced in large classes.

Several aspects of the ideal new learning environments described above can be built using a variety of digital multimedia, i.e. audio, graphics, visualization, animation, simulation, and, yes, text (but in the right contexts). However, there is only one ICT application that is able to create environments combining ALL the required aspects, i.e.:

- the overall context, global understanding, and complete 'big' picture;
- a variety of learning avenues which much more fully utilize the many possible avenues for input and learning in the human mind;
- a wide variety of quality hands-on experiences which encourage learners to choose, explore, manipulate, test, and make transformations within the 'objects and ideas' environment provided.

That application is a fully interactive, simulated, virtual 3D environment, i.e. ***Virtual Reality***.

There is a great deal of energy currently being expended in digitizing existing text-based learning material and making it available electronically (particularly via the web). This has some value, since it makes this learning material more easily available to those who can make use of it. However, it does not significantly address the fundamental learning issues described above (in fact, it perpetuates most of the problems). As multimedia-based new learning material is developed along the above guidelines, the importance of 'learning objects' will become clear. Another crucial issue that cannot be addressed in depth here, but is central to the new learning material, is the balance between independent and interactive learning. A greater understanding will emerge of which is the more appropriate learning/teaching mode, but it is highly complex since it depends on the age and sophistication of the learner; the subject material to be learned; the availability and capabilities of teachers,



lecturers, tutors and mentors; and the possible groups of learners that can be formed. Indeed, a variety of group learning regimes (both physical and electronic) appears to have particular potential for improving learning experiences, and helping to improve the quality of the new learning material on an ongoing basis.

Who is going to produce this wealth of new learning material? It cannot be left to teachers and lecturers alone for several reasons. Most of them are already overloaded with expanding class sizes, and a growing administrative load that seems to take them ever further from their learners. But, perhaps more importantly, very few of them have the pedagogical expertise — they were usually employed as subject specialists, not pedagogists. The process must be driven both by current pedagogy, and the major new insights that will emerge from the growing flood of brain research. So the primary players are most likely to emerge from the tertiary/research sector, but will need the support of teachers/lecturers, ICT experts, public and private sector stakeholders, and, of course, the learners themselves.

The questions of where will this be done, how, when, and who will fund it have yet to be addressed. Clearly, the necessary facilities and capacities do not exist, especially in the developing world, where the need is greatest.

## Teaching and Learning in the Developing World

This article has not yet differentiated between education in the developed and developing worlds. The intention has been to emphasize that there is a global crisis in education, what the fundamental causes of that crisis are, and where the solutions lie. We, educationalists, have been doing the wrong things for too long. The good news is that, at least in the developed world, we have all the resources and capabilities to implement the solutions. If the USA could mobilize itself between 1962 and '69 to reach the moon, surely the world can mobilize itself along the above lines to achieve UNESCO's 'Education for All'<sup>63</sup> within a decade or two. Who will argue that EFA is less important than reaching the moon?

Although the education crisis is global, of course the situation is significantly worse in the developing world, and particularly in Africa. Many argue that poverty, and its 'high tech' manifestation, the 'digital divide', will always be with us. They shrug and say that it is not, and will never be possible to provide even second class education to the 70% of Africa's poor and remote population that lives beyond the main cities. But is this not the stuff of self-fulfilling prophecies? Are these hundreds of millions of excluded people more remote and less important than the moon?

## Status of 'Formal Education' in the Developing World

At all levels, and in all African countries, the education sector is struggling to maintain the status quo, let alone make radical changes. Of all the levels, the tertiary sector has the best resources and capabilities. Certainly, within most of Africa's HEIs there are many individuals who have the expertise to make a significant impact if we could pool their resources. But do the HEIs themselves (which maintain the elitism and traditionalism established by their colonial sponsors) have the vision and flexibility to allow this to happen?

The essence of UNESCO's 'Education for All' challenge is to work toward the eradication of abject poverty throughout the world. The global tertiary sector, combined with their traditional values concerning the well-being of society, should be ideally positioned to address this. However, today's universities are faced with the perplexing task of balancing the tensions of Sir John Daniel's eternal triangle, i.e. to improve quality, cut their costs and to serve more and more students<sup>64</sup>.

<sup>63</sup> UNESCO, 2000. Text adopted by the World Education Forum Dakar, Senegal, 26-28 April 2000.

<http://www2.unesco.org/wef/en-leadup/dakfram.shtml>

<sup>64</sup> Daniel, J.S. 1999. (reprint with revision) "Mega-Universities and Knowledge Media: Technology Strategies for Higher Education". Kogan Page: London.

Global access to tertiary education has grown from 6.5 million enrolments in 1950 to 88.2 million in 1997, growth of more than 1200%. Although this growth appears remarkable, the global education crisis has deepened. In 1995 a little more than half of the world's tertiary students (47 million) lived in the developing world, with a gross enrolment ratio mostly below 15%. However, the average for Sub-Saharan Africa remains less than 4%. Saint<sup>65</sup> points out that at least 16 countries in Sub-Saharan Africa will need to double current tertiary enrolment in the coming decade just to maintain the existing and unacceptably low gross enrolment ratio.

Around the world today we need the equivalent of one large new university to open every week just to keep tertiary participation rates constant. But, most of the world cannot afford the established campus model. Traditional face-to-face delivery will simply not be able to scale up provision to the levels required by the global demand in a manner that is capable of maintaining a sustainable balance among the tensions of the eternal triangle.

*“Under the conventional campus model, individual faculty members carry the responsibility for teaching. They have relative freedom in organizing the learning environment regarding the implementation of the curriculum, and in how to teach in the classroom and assess learners. The campus model is robust and easy to organize, but the quality of provision is highly variable (excellent subject specialists/researchers are seldom good teachers). This model is extremely difficult to scale up, limited by the physical campus facilities and the number of learners that an individual faculty member can realistically manage.*

*The distinguishing pedagogical feature of higher education (HE) massification (e.g. the mega-universities) is that, instead of giving individual faculty the responsibility for teaching, sophisticated learning systems have been developed based on innovative divisions of labour where the responsibility for teaching is carried collectively by the organization. The differentiating feature of mass provision via open learning systems is that the institution teaches, not the individual teacher. By replacing the traditional lecturer model with a total teaching system where the functions of teaching are divided into a range of specialisations, HE massification is able to scale up the delivery of quality teaching to levels that simply are not possible in conventional campus-based or dual-mode models.”<sup>66</sup>*

Whereas there is a growing realization that ICT-supported mass provision represents the only viable solution to this crisis, particularly in the developing world, there is a grave danger that many forms of technology-mediated distance education currently being practised will be misinterpreted as the ‘massification solution’.

Of all countries in Africa, South Africa's education system is probably healthiest. Yet, a National Plan on Higher Education (NPHE) has recently been instituted because the higher education system is seen to be far from optimally organized to meet the country's human resource requirements. It is seen to be extremely wasteful and guilty of squandering valuable resources, delivering a poor return on investment measured in terms of graduate and research output. But NPHE does not talk of the fundamental changes highlighted in this article, but instead advocates rearranging the current systems, processes and curricula to provide more efficiency and effectiveness. This is understandable, since the motivation for change stems from the extreme frustration of external stakeholders in the public and private sectors, not from those academics and researchers with the relevant pedagogical expertise. But what does this say to the hundreds of thousands of potential students in South Africa's remote and rural areas who cannot be reached by the current system, rearranged or not?

### **New Learning Materials for Africa**

The message is clear. If we in Africa are only prepared to tinker with the current bricks-and-mortar-based education systems imported ‘as is’ from the developed world, dominated by text-intensive ‘show-and-tell’ methods, and unresponsive to our knowledge of how the human mind best learns, then that system will

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<sup>65</sup> Saint, W. 1999. “Tertiary Distance Education and Technology in Sub-Saharan Africa”. Washington DC: Working group on Higher Education, Association for the Development of Education in Africa, The World Bank.

<sup>66</sup> Extracted from “Leading ODL Futures in the Eternal Triangle: a Mega-University Response to the Greatest Moral Challenge of Our Age”, by Sir John Daniel and Wayne Mackintosh, 2002: in press.

continue to deteriorate. Superficial tinkering has not worked to date, and cannot work as explained above. The changes need to be fundamental, and creating new learning materials relevant to Africa's situation is an excellent place to start.

An inevitable response is that the developing world, and particularly Africa, does not have sufficient resources to develop its own new learning materials. Instead, we should wait, observe and take from the developed world whatever they produce over the next few years. In the meantime, we should persevere with the text-based learning material (mostly imported, usually from the old colonial powers for language reasons), because it is 'better than nothing'. Perhaps, but we now know how far it is from the best we can do.

To illustrate how flawed this argument of self-perpetuating dependency is, it is useful to look at Africa's ICT Industry (or the lack of it). Almost all ICTs in Africa (hardware and even software) are imported from the developed world (at significantly higher prices), and are usually implemented in the larger organizations in the public and private sectors, often funded by developed world loans. These products may be 'customized' to partially fit the African circumstances of these large organizations (although they were in no way designed with such circumstances in mind – they will always be designed for developed world needs). But, how well do these developed world ICTs serve the needs of the vast majority of Africa's people, the poor, the disadvantaged, the excluded? They don't. They were not intended to.

Can importing and customizing do anything other than increase the developed world dependency of the African elites whilst leaving the poor and remote majority even further behind? Manuel Castells argues that this process has stimulated the emergence of the 'Fourth World' made up of multiple 'black holes' of social exclusion, and including most of Sub-Saharan Africa. He warns that "*the rise of the Fourth World is inseparable from the rise of informational, global capitalism*", and identifies illiteracy as a primary global cause of unemployment, poverty and social exclusion<sup>67</sup>.

Is the situation any different if we continue to import and attempt to customize developed world learning materials, including their latest ICT-enhanced new learning materials? If we examine the wide range of 'life-long-learning' needs of the broad spectrum of people in Africa, not just the elites, it becomes obvious that most imported learning materials are of little use to the hundreds of millions of excluded people for reasons of literacy, language and/or culture.

- *Literacy*: Accurate figures for literacy in Africa are problematic for several reasons, including the different definitions of literacy used. Certainly, if the same measures of 'functional illiteracy' for the USA used by Castells are employed for Africa, levels above 70% would be common, especially in populations outside the main cities. Hence, the problems with text described above are significantly amplified in Africa, which perhaps should be thought of as a 'text-o-phobic' continent for the purposes of transforming education. Instead of importing the dominantly text-based new learning materials from the developed world, materials need to be developed locally that specifically address the needs of the majority by reducing text to a minimum. Can materials be produced where most text is replaced by the much more natural voice? Can these materials use visualization techniques rather than text to more accurately describe places, people, events, etc.? Can these materials use interactive animation and simulation rather than text to allow learners to actively investigate how things dynamically happen and work? Yes, in every case – easily accessible digital multimedia tools exist for all these needs.
- *Language*: Many African people are at least bilingual, having both a local language, and a European language imposed during Africa's colonization. Since most of Africa's education material is imported from the old colonial power, the colonial language, not the indigenous language(s) dominate the education systems. This may appear reasonable in the large cities, where many youngsters are exposed to and therefore naturally learn both colonial and indigenous languages in their infancy. But in the remote and rural areas, where most of Africa's population lives, the picture is very different.

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<sup>67</sup>Castells, M. "The Information Age: Economy, Society, and Culture", vol. 3, "End of Millenium", Blackwell, pp. 70 - 165, 1998.

Here, only local indigenous languages are heard and learned in infancy. The colonial languages are taught (usually not very well, by teachers who themselves are seldom fluent) to 8-14 year old learners, long after the 'natural window' for language acquisition has closed. Very few reach reasonable proficiency, even for speech, whilst the much more difficult reading skills are consequentially poorer. Learners in these remote, impoverished areas of Africa have enough disadvantages without being forced to read and listen in a medium which is, literally, alien to them, producing at best, rote learning, at worst, no learning. Therefore, the locally produced new learning materials should allow the learners to choose whichever they prefer of several local indigenous languages, both for voice, and text. This is already technologically possible, and as African languages are added to the now mature language technology platforms, it can grow significantly. Now is the time to start the process.

- *Culture*: We have seen that for quality learning it is very important to contextualize the subject being learned – to paint the big picture first. This is particularly the case where learners are attempting to understand and master complex, often abstract concepts, which are especially common in maths, the natural sciences, and engineering. Man has always used analogies to handle such complexity, and they remain an excellent learning aid. However, analogies, like language, are highly culturally dependent, and the analogies commonly used (especially in imported textual material) reflect the colonial, not the indigenous culture. Using a London bus to contextualize the learning of Newton's Laws of Motion throughout much of rural Southern Africa (where London buses are even rarer than at London bus stops) has been failing for decades. Sadly, it has usually been the intelligence of the learners that has been questioned, rather than the quality of the learning material and teaching. Therefore, locally produced new learning materials should use culturally relevant analogies, often expressed via visualization, animation, or simulation rather than text. But the supporting language material (voice especially) should be in the appropriate range of indigenous languages.

It should now be clear that the multimedia-based new learning environments that are essential in the developed world, are even more needed in the developing world in general, and Africa in particular. It should be equally clear that these materials must not be imported, but must be locally produced to address the wide range of learning needs of Africa's excluded majority taking full account of the local literacy, language and cultural issues.

Again, there is only one ICT application that is able to satisfy ALL the above African learning requirements by creating fully interactive, simulated, virtual 3D environments, i.e. *Virtual Reality*.

Wayne Mackintosh  
University of Auckland  
*New Zealand*

Lead Facilitator's Report

**PILOT OFFERING  
UNESCO IITE SPECIALISED TRAINING COURSE  
“INFORMATION AND COMMUNICATION  
TECHNOLOGIES IN DISTANCE EDUCATION”**

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## 1. Executive Summary

*“The IITE course has been an eye opener and a journey into the practical realities of distance education in general and use of ICTs in distance education in particular. It was not easy, in fact it was very demanding and required personal commitment and self-discipline to some extent. However, formal course content blended with the practical realities of the various countries and the input of the facilitators rendered this course commendable. The course is based on use of ICTs in distance education and I believe it achieved its overall aim. We learned by actually using various technologies and the experiences of the various countries and facilitators will enable us to avoid many of the pitfalls associated with use of ICTs in our future development of distance education courses and our choice of appropriate technologies. The on-line component was particularly interesting and a range of skills was acquired in the process. It has been an enriching experience.”*

Participant’s comment (unedited)

This report documents key aspects of the pilot offering of the UNESCO IITE specialised training course: *Information and Communication Technologies in Distance Education*.

Nineteen participants attended the course from eleven Anglophone countries in Sub-Saharan Africa including Botswana; Ethiopia; Ghana; Kenya; Mauritius; Namibia; Seychelles; South Africa; Swaziland; Tanzania; and Uganda; With the inclusion of the facilitators and attendees from IITE, four continental regions were represented, namely Africa; America; Asia and Pacific; and Europe. Clearly, this initiative is a prime example of globalization, which would not have been possible without digital communication technologies.

This report provides evaluative feedback on:

- course aims and corresponding delivery model;
- the distance education platform (Learning Management System);
- analysis of participants’ evaluations; and
- recommendations for future offerings of the course.

The following key recommendations derived from the pilot offering are listed for consideration:

1. Continuation of the activities associated with this project combined with the establishment of a coordinated virtual network to establish a community of practice around this initiative.
2. Commissioning the development of an additional module covering the skills and requirements for developing a sustainable business plan for the local delivery of the course.
3. Providing additional training in the use of the Distance Education Platform (DEP) in the role of administrator of the system.
4. Extending the duration of the online distance education component of the course, as the 6-week period used in this pilot for online activities, was too demanding for participants in full-time employment.
5. Implementing the refinements identified as a result of the pilot testing of the DEP.

All participants completed the course successfully — achieving well above the minimum criteria set at the onset of the course. The surprisingly high participation rates, the quality of work submitted by the participants and the individual participants’ evaluations provide ample evidence to conclude that the pilot offering of this course has been an overwhelming success.

## 2. Course Aims and Corresponding Delivery Model

The delivery model was designed in accordance with the specific needs and experience of the target audience. In this way the attainment of the general aims of the specialised training course could be maximized but at the same time additional objectives associated with the pilot offering could be specified.

### 2.1. Course Aims and Objectives

The primary aim of the course was to certify participants as future facilitators of the course.

This necessitated the attainment of the content objectives of the course, namely to inform participants about each of the following:

1. The concept of distance education (DE), its history and the role of Information and Communication Technologies (ICTs) in this particular form of education.
2. Achieving the core functions of the teaching-learning transaction in DE and the corresponding organizational, social and technological implications.
3. Overall system, programme, and course design procedures in using ICTs.
4. What is known about learning and the special needs of learners and corresponding implications for ICTs in DE.
5. Principal policy issues at institutional and national levels.

While the majority of participants have extensive experience of conventional higher education in Sub-Saharan Africa, only 26% of the participants had firsthand experience of online learning. (This information was confirmed by an online voting carried out on the Distance Education Platform during the first face-to-face seminar). Therefore, it was necessary to provide training in the use of the Distance Education Platform prior to the commencement of online activities. In addition, it is imperative that the course is rolled out in the individual UNESCO member states and consequently it was necessary to provide support for drafting a proposal for the continuation of these activities in participants' respective countries during the 2nd seminar.

In addition to the content objectives of the course listed above, the following aims for the pilot presentation of the course were also identified:

1. To establish a network of support relationships across national boundaries that will assist participants in rolling out the provision of this course in their own respective countries.
2. To gain a deeper understanding of UNESCO IITE's role in furthering the objectives of "Education for All" in higher education within Sub-Saharan Africa.
3. To avail of the opportunity of onsite visits to different aspects of Africa's oldest distance education university.
4. To understand the intended purposes of the specialised training course *Information and Communication Technologies in Distance Education* and to gain insight into the history of its development.
5. To receive training and support in the Learning Management System developed for the online delivery component of this course.
6. To draft a business plan for the presentation of this course in the participant's home country.
7. To avail of the opportunity of the South African visit to interact with South African distance education leaders regarding a range of DE policy issues.
8. To receive training and support in aspects relating to online delivery of this course.
9. To evaluate the pilot offering of this specialised training course.
10. To receive certification for the successful completion of this course.

It is concluded that the course aims and objectives were attained with the pilot presentation of the course. This is based on the participant's overall evaluation of the course (see Section 4) combined with the certification of the participants in accordance with the predetermined assessment criteria.



## 2.2. Delivery Model

The delivery model is described in terms of the strategies adopted for presentation, assessment and interaction.

### Presentation Strategy

The presentation strategy describes how the learning content was presented to the participants. The pilot offering of this course was divided into three parts:

- *Part 1:* A 5-day face-to-face seminar (14 – 18 October 2003), to prepare participants for the forthcoming online activities. During this seminar Modules 1 and 2 of the course materials were covered in parallel with hands-on training on the use of the Distance Education Platform;
- *Part 2:* Online learning activities where participants continued with their studies over an effective 6-week period (20 October – 6 December 2003), taking transit times into account. During the online session, Modules 3, 4 and part of Module 5 were covered. Each participant completed 3 written assignments in addition to the moderated online discussions;
- *Part 3:* A 5-day face-to-face seminar to complete Modules 5 and 6 of the course. In addition, the final face-to-face seminar focused on developing the skills necessary for the successful implementation of the course in the participant's home country. An overall evaluation of the course was administered prior to the joint UNESCO IITE/UNISA certification of all the participants.

Three facilitators assisted with the presentation of the course:

- Associate Professor Wayne Mackintosh (Director of the Centre for Flexible and Distance Learning, University of Auckland and member of the course development team);
- Dr Bob Day (Consultant, ICTs for African Development and Special ICT Advisor to President of the Council for Scientific and Industrial Research); and
- Linda Black (Online Instructor, Pennsylvania State University and member of the course development team). Wayne Mackintosh was the lead facilitator and was responsible for the design of the instructional strategy, assessment strategy and led the online activities.

IITE was represented by:

- Prof. Valery Meskov (Executive representative of IITE at the seminar);
- Dr Yuri Zaporavanny (Project Manager);
- Dr Azat Khannanov (Facilitator for the DEP and onsite technical support – 1<sup>st</sup> Seminar);
- Dr Natalia Severova (Technical advisor and support – 2<sup>nd</sup> Seminar).

Copies of the original programme outlines for the first and second face-to-face seminars are provided in Annex 1 and Annex 2, respectively. The group requested minor refinements to these programmes, which were adopted by consensus decision. For example, the panel discussion was rescheduled for 2<sup>nd</sup> seminar given participant's request for an opportunity for an earlier finish on one-day, as no "free-time" was scheduled into the programme; and the programme of the 2<sup>nd</sup> seminar was amended to accommodate the live web cast link to Geneva for the Round Table on *Education and Knowledge Societies*, held as one of UNESCO events at the World Summit on the Information Society (WSIS). The participant grouped posed to questions to the Round Table panel discussion from South Africa and were responded to by the panel members.

### Assessment Strategy

The assessment strategy for the course was designed to ensure maximum coverage of the content objectives and to promote high levels of participation. Furthermore, the assignments were designed to develop the skills necessary and to provide the information required for developing a sound business plan to deliver the specialised training course in the participants own country. Three written assignments were set:

- Assignment 1 was a situational needs analysis of higher education in the participant's home country with special emphasis on the barriers and potential of ICT-enhanced learning. Apart from covering

the objectives of Module 1 and Module 2, this assignment was used as the contextual analysis for developing the business plan for presenting the specialised training course in the participant's respective counties.

- Assignment 2 focused on the learning objectives of Module 3. It covered the advantages and disadvantages of using ICTs for DE in developing countries as well as a simulated course design exercise. These skills were necessary for the design of an appropriate delivery model for the specialised course in the business plan.
- Assignment 3 was a dedicated assignment covering the design process for the delivery of the specialised training course.

A copy of the assignment questions is provided in Annex 3 of this report.

A 100% submission rate for the 3 written assignments was achieved. This is exceptionally high for a distance education offering where students are in full-time employment.

The criteria for successful completion of this course were based on three components:

1. Successful completion of the 3 written assignments;
2. Quantity and quality of participation in the online discussions;
3. Participation in the face-to-face seminars.

Apart from the 100% submission rate on the assignments, the quality of work submitted by the participants was of a high standard. Each of the participants that started the course completed the course and were subsequently certified as tutors.

### **Interaction Strategy**

Student-facilitator and student-student interaction was promoted through the design of:

- appropriate activities during the face-to-face seminars; and
- engaging online activities that would encourage high levels of participation and promote quality postings.

Participation rates during the online activities were extremely high, especially when considering the seniority of many participants and ongoing responsibilities of full-time employment. This is evidenced by:

- an average login once-per-day by each participant on the web site for the duration of the course;
- an average of 4.75 discussion forum postings per week was maintained. Postings were of a high quality and participants were keen to share their extensive experience of education in this new context of promoting ICTs for development;
- 187 e-mail messages were sent to the lead facilitator averaging almost 10 e-mails per student to the course leader. This shows a high-level of student-teacher interaction.

There are examples where participants experienced difficulties with connectivity at their respective institutions and in each case these participants made use of local Internet café services at their own cost. This demonstrates the high levels of commitment by the group. A tangible spirit of camaraderie was evident throughout the course and there was a sense of "letting the group down" in cases where visits to the site were delayed because of connectivity issues, personal and/or work-related commitments. There was an ethos among participants to apologise to the group when they were unable to visit the site for a few days. It was, indeed, a great privilege to be part of this pioneering initiative.

Summary statistics relating to participation levels and student achievement are provided in the following table.

	<b>A1</b>	<b>A2</b>	<b>A3</b>	<b>Number of Site Visits</b>	<b>Forum Postings</b>
Alex Souffe (Seychelles)	80	90	S	62	40
Dr CWS Sukati (Swaziland)	70	80	S	27	33
Dr Theophilus Ossei-Anto (Ghana)	75	85	S	176	56
Habtamu Zewdie	90	90	S	83	34
Henok Workye	65	60	S	55	23
Mr Benjamin Bussu	70	60	S	56	44
Mr Emmanuel Atta Gyamera	65	70	S	86	52
Mr Eric L Setabo	70	67	S	36	44
Mr Geoffrey N. Shakwa	90	65	S	40	43
Mr Phillip Ouma Ayoo	85	85	S	64	34
Mr Sam Siminyu	85	85	S	61	26
Mrs Fiona Ernesta-Uranie	80	90	S	42	39
Ms Irene Chadibe	80	80	S	23	20
Ms Lindiwe Shabala	80	80	S	44	19
Ms Rholene Bok	90	65	S	57	42
Prof. Satoki T. Mahenge	70	60	S	22	53
Prof. Olive M Mugenda	80	55	S	22	35
Prof. S.M. Rajab	80	75	S	56	33
Roshun Dhurbarrylall	80	70	S	53	52
<b>Average for the course</b>	<b>78</b>	<b>74</b>		<b>56</b>	<b>38</b>

#### Key

A1: Percentage for Assignment 1

A2: Percentage for Assignment 2

A3: Submission of Assignment 3 – (Assignment 3 was awarded full submission credits, if completed and submitted, and is recorded as “S” in the table above.)

Number of Site Visits: Absolute number of visits to the course web site for the duration of the course;

Forum postings: Threads introduced and individual postings for the duration of the course.

Based on the experience of presenting the pilot, it is concluded that the delivery model is appropriate for the target audience. There is little room for improvement on this delivery model apart from extending the duration of the period for the online activities<sup>1</sup>. As the target audience did not have experience of online education, the training provided on the DEP during the first seminar has undoubtedly contributed to the success of this initiative. Furthermore, the opportunity to establish personal relationships before working online was a key component to promoting and maintaining the solidarity of the group.

### 3. The Distance Education Platform

The IITE technical team developed a dedicated, online distance education platform (DEP) for the pilot offering of the course. As part of my contract I was responsible for developing a specification list for the DEP.

<sup>1</sup> It is recommended that a minimum of 2-weeks per module that should be covered during the online session, should be provided for. In addition, 2 weeks should also be provided with regards to the preparation of written assignments. Therefore, in the context of this delivery model a minimum of 8 weeks is recommended for the online component of the course

Having extensive experience with a number of software developments for education, I must commend the IITE development team for their work on this project. The platform was developed in record time and I was amazed with the reliability of the system during its pilot implementation on this course. For the duration of the course, I did not experience any downtime on the system, notwithstanding the high levels of interaction on the site. Deserving particular mention are the following features of the platform:

- A contemporary visual design that communicates and promotes a professional ethos for both instructors and students.
- A DEP that is driven by the pedagogical functions of distance teaching, namely presentation of content and access to relevant resources; functional interaction; and flexible assessment capabilities.
- The inclusion of a web-mail based system in the DEP which ensures that all communication relating to the course is contained within the course web site. This avoids the problems associated with organizing and classifying e-mail messages with a proprietary e-mail client.
- An intuitive navigation framework that is easy to use. The web site layout and navigation devices have adopted the universal tropes associated with contemporary web site design and this has contributed significantly to the usability of the DEP.
- The inclusion of a dedicated area for course arrangements where instructions and timetables relating to the teaching of the course are posted.
- The voting feature has proved to be a valuable tool to obtain feedback on key aspects relating to the course, but also proved invaluable as a motivational tool for online activity.
- The web library feature promotes constructivist learning principles because students have the freedom to incorporate resources which they have found useful in their studies.
- The assignment submission, file sharing features and corresponding administration have worked exceptionally well.

I have identified a few minor areas for future improvement of the DEP for consideration by the technical team.

- Statistics relating to the classification of discussion forums should be generated dynamically. In other words, for each forum created by the instructor, access statistics should be listed according to the forums that were created by the instructor. At the moment discussion forums are predefined, and this is constraining.
- When students submit assignments, these are sent to the web-mail box of the main moderator as a normal e-mail communication. It would be helpful if the system had an assignments folder in the mail-box, and when a student submits an assignment this is automatically directed to the assignments submitted folder. In this way assignments will be separated from the ordinary communication in-box which becomes rather cluttered during assignment submission time.
- Currently, when a student views a posting within a thread, the originating message disappears from view. Adapting the system in a way that displays the text of the message to which the user is responding would enhance usability of the system.
- Finally, in the administration environment there is still some Russian-English translation that must be completed. As an experienced online teacher, I did not personally find this to be a problem because it was relatively easy for me to predict the functionality of the links and buttons that were displayed in Russian. However, less experienced users may find this to be problematic.

## 4. Analysis of Participants' Evaluations

Participants attending the pilot offering of the course reported high levels of personal satisfaction as indicated in the following unedited extracts of the students' evaluations of the course:

- *"I came onto the course with a lot of skepticism over whether it was appropriate to even start discussing ICTs in DE on a continent like Africa. The course gave me an opportunity to think again. By the end of the course, I am convinced that if Africa has to forge ahead in development, ICTs are a key, and more so for DE."*
- *"A cutting edge, contemporary, thought provoking and yet very informative course on ICTs and Distance Education. ... It has been such a wonderful experience for me."*
- *"This is the most useful course I have undertaken in recent times. It was very informative, well thought out, well presented and professionally articulated."*
- *"Going through this course has been one of the best things that ever happened to me ... I can hardly thank IITE enough for this unique and wonderful and lifelong learning experience."*

Three evaluations were administered:

- an evaluation of the first face-to-face seminar conducted online on the final day of the seminar;
- an evaluation of the second face-to-face seminar administered online on the final day of the second seminar;
- an overall evaluation of the course, also conducted on the final day of the second seminar.

This section provides a summary analysis of each evaluation session. Full transcripts of participants' comments with regards to each evaluation session are provided in Annex 4, Annex 5 and Annex 6 of the report respectively.

### A Summary of the Evaluation of the 1st Face-to-Face Seminar

Evaluation is contextual. Therefore, the first question of the evaluation focused on establishing the evaluation context from the participants' perspective by asking them to identify the main reason(s) why they had participated in the seminar.

Based on students' responses there was a consensus expectation to learn about ICTs in DE. The need to gain insight into the theoretical foundations of distance education underpinned many of the student's responses. In particular, students expressed the need to acquire knowledge and corresponding practical skills regarding how digital ICTs could be used to enhance DE delivery in Africa. There was a shared belief that ICT-enhanced DE is crucial for widening access to education in Sub-Saharan Africa.

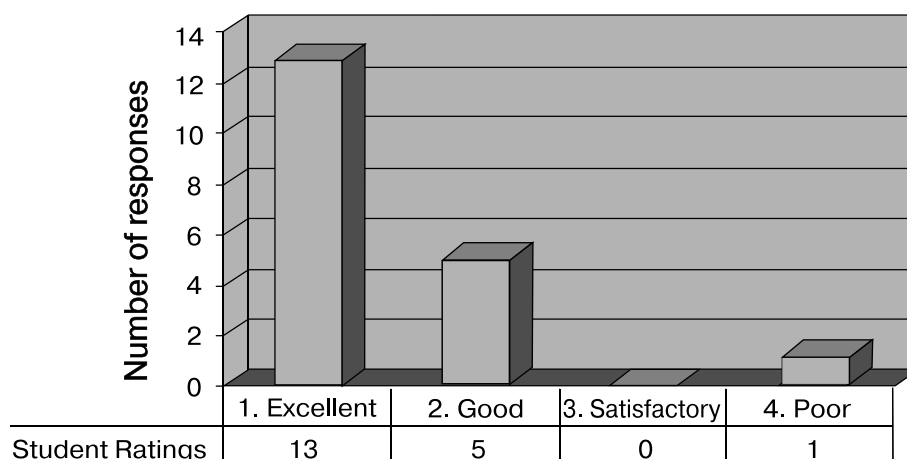
Clearly, the selection process for identifying prospective participants adopted by IITE resulted in a high match between the needs of the group and the objectives of the course. Also, this attests to the quality of the needs analysis phase of the design process carried out by the development team of the course. Deserving particular mention is IITE's foresight in arranging a critical review of early drafts of the course materials at the High Level Expert Meeting held in Tanzania during September 2001. These processes have ensured that the course materials are designed for the specific needs associated with developing society contexts.

Reflecting on the ways the seminar had satisfied participants' expectations the following general points were emphasized by the group:

- the hands-on approach used to demonstrate an online learning environment while at the same time enhancing participant's skills for using the DEP for the online component of the course;
- the opportunity of visiting a mega-university and experiencing firsthand aspects of UNISA's systems;
- the solid foundations pertaining to the theory and practice of DE;
- the quality of the learning resources including the course materials, carefully selected readings and the wide experiential base of the facilitators; and
- the opportunities created for participants to share experiences from their own countries and build support networks for the work to follow.

The first face-to-face seminar was awarded a high average rating of 1.42, thus falling into the “excellent” range of the Likert-type scale used for this item. These results are represented graphically below.

Overall rating of 1st face-to-face seminar



With regards to aspects where the seminar did not meet students’ expectations and suggestions for improvement, the group highlighted the following points:

- The need to cover a wider range of ICTs beyond web technologies that could potentially be used in distance education;
- The tight time-schedule of the programme corresponding with the expressed need of participants to spend more time in class discussions focused on sharing national experiences;
- Organisational issues in particular transport arrangements from the place of residence to the seminar location on the UNISA campus;
- The desire for more feedback regarding online postings made by students during the face-to-face seminar;
- More attention to the practicalities of designing and presenting an online course.

The number of the shortcomings listed above was made in the absence of detailed knowledge of the course objectives that would be covered later in the course. For example, media selection and different technologies used to support distance education was to be addressed later in the course; and the second face-to-face seminar was planned to include aspects relating to the design and implementation of online teaching.

Using a cost-benefit approach, a decision was taken by the lead facilitator to optimize the time and corresponding expense of bringing a large international contingent together to prioritize those activities that would not be possible during the online component. For example, detailed discussions sharing national experiences could be conducted effectively in the online environment. In fact, the first assignment was designed for this purpose and students posted their assignments online for all to view and discuss. However, onsite visits to key aspects of the UNISA system, for example, the production and despatch of materials and face-to-face interaction with student support managers would not be possible at a distance. With regards to feedback to online postings made by participants during the course, this was not practically feasible as the facilitators were engaged with face-to-face presentations, and time did not allow for individualised feedback. However, during the online session personalized feedback was provided to individual postings on the web site by the facilitators of the course.

Therefore, the aspects identified by participants regarding expectations that were not met during the seminar were not judged to be material or substantive. However, a number of organisational suggestions were taken into account for the planning of the second seminar. For example, posting the seminar programme on the web site before commencement of the second face-to-face session; providing the list of readings that would be covered before arriving in Pretoria so those participants who wished to read the papers in advance could do so; and opening a discussion forum for suggestions for the second face-to-face seminar. These suggestions were taken into account when planning the programme for the second session in Pretoria.

## A Summary of the Evaluation of the 2nd Face-to-Face Seminar

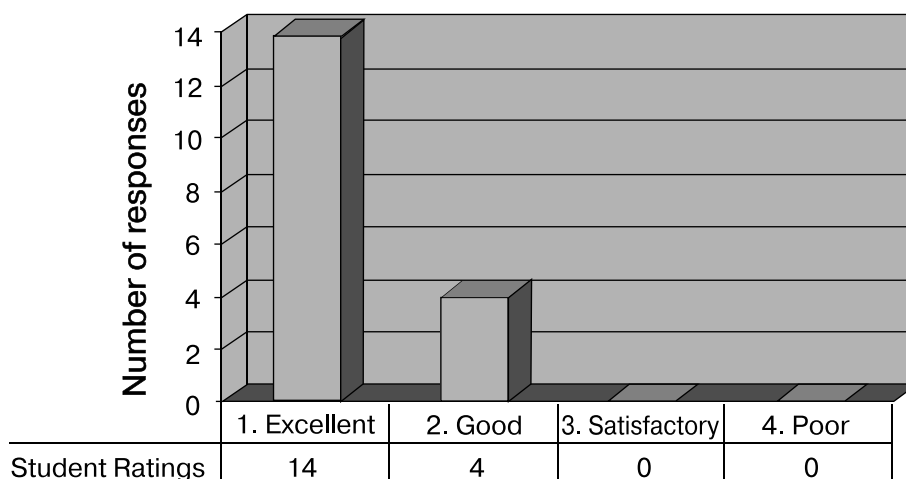
The group highlighted the following aspects they found most useful during the 2nd seminar:

- The panel discussion with South African distance education practitioners and managers;
- A majority reference to the activities associated with preparing a business plan for offering a distance education programme;
- The facilitated sessions covering the practical aspects of teaching online;
- Availing of the opportunity to interact with IITE representatives regarding the way forward for implementing this course in participant's own countries.

Taking into account the limited experience of the group with regards to drafting a business plan, the facilitators found that participants were struggling with the process of developing a business plan. Surprisingly, the participants indicated that this was one of the most useful aspects of the course. Consequently, this report recommends that an additional module for designing and developing a business plan should be added to the course.

The overall rating for the 2nd seminar was also awarded a high average rating of 1.22 — slightly higher than the 1st seminar. The slight increase is ascribed to the 2nd evaluation being administered after completing the course when participants were in a better position to evaluate the extent to which expectations were met by the course.

Overall rating of 2nd face-to-face seminar



Regarding suggestions for improvement of the 2nd face-to-face seminar the following points were highlighted:

- More time for the assimilation of content given the tight schedule of the programme;
- Provision should be made for covering the practical aspects associated with administering online courses using the DEP;
- Refraining from including changes to the original programme.

The presentation of the course adopted an ambitious timetable with regards to the attainment of objectives within the available time. Certainly, extending the duration of the seminars could enhance assimilation of content. However, the travel and accommodation costs associated with face-to-face seminars of an international group must be taken into account. One way of addressing this issue in future offerings without escalating costs of provision would be to extend the duration of the online component of the course. Notwithstanding the tight schedule, the course objectives were achieved, as summarized by one participant as follows:



*“The course design was ambitious. With hindsight, it would look unthinkable to deliver so much in a short time to people on full-time duty and also to [complete] three written assignment[s]. The assignment questions were open-ended and encouraged people to pick-up research topics in that direction. ... I would like to congratulate the course moderators for ensuring [the] high level of objective attainment.”*

There was an expectation that more attention would be given to the practicalities of administering online courses using the DEP. However, time constraints did not allow for including this objective in the seminar. Furthermore, the DEP was not designed for face-to-face training of administration features to a large class. Technical and security problems would have arisen had administration accounts been created for the nineteen participants on the same course, particularly when simultaneous changes to the same feature would have arisen in such a situation. For example, attempting to register a new assignment on the database where all nineteen participants would be setting-up an assignment with the same assignment number. Moreover, there are confidentiality issues that would not permit the allocation of administration accounts on the course web site, because participants would then have unencumbered access to personal communications intended for the administrator of the course. This issue providing administration access was considered by the technical team during the 2nd seminar. After careful scrutiny of the advantages and disadvantages associated with the technical and security issues it was decided that creating individual administration accounts for each participant would not be advisable.

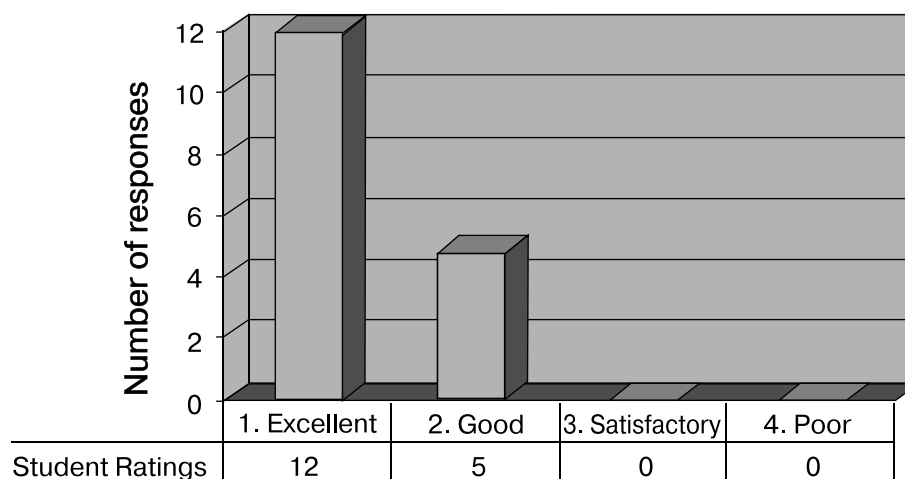
Finally, satisfying the needs of a diverse group in a face-to-face situation is always challenging. Minor adaptations were made to the programme after full consultation with the group. For example, the inclusion of a session from an expert on wireless communication technology and the link-up with the Geneva web cast. Notwithstanding open communication and consultation with the group before adaptations were made, many participants still remarked that facilitators should have adhered to the original timetable.

### A Summary of the Overall Evaluation of the Course

Participants were asked to provide feedback on the extent that the course aims were achieved. For convenience the course aims were listed in the body of the question concerned. There was a consensus opinion that the course aims were achieved. Some participants expressed the need for covering selected objectives in greater depth. Participants alluded to the need for more training on the DEP from the perspective of using the system as a moderator or instructor. As explained above, this was not technically possible.

Again, the overall rating was awarded a high average score of 1.29 thus falling within the “excellent” range. The distribution is displayed graphically below.

Overall rating of the course



In conclusion, drawing on the feedback derived from the course evaluations, the course has been an overwhelming success. Its strength lies in the holistic curriculum approach that is adopted with regards to ICTs in DE. At the same time the course provides an authentic online learning experience for participants allowing them to experience the pedagogical power of digital technologies from the learner's perspective. This course has succeeded in managing the delicate balance between theory and practice as affirmed by the comments of one of the participants:

*“While quite demanding for a full-time employee, this course is a necessary tool for an ODL [open distance learning] practitioner. It gives a holistic picture of what a successful ODL programmes could and should entail. To start with, there is a lot of theory on ODL, which will benefit the new comers into the world of ODL. Then there is a comprehensive hands-on experience on how to work online. While it gives the participants the theory of using ICTs in ODL, it also provides a practical experience of how many ICTs can enhance learning.”*

## 5. Recommendations for the Way Forward

Drawing on the experiences as lead facilitator of this course and the evaluations provided by participants, a number of recommendations are provided for consideration. These recommendations are presented with the intention of building on the solid foundations and success already established by IITE with this project. In each case limited clarification and justification, where necessary, is provided.

**Recommendation 1:** *Continuation of the activities associated with this project combined with the establishment of a coordinated virtual network to establish a community of practice around this initiative.*

This course is unique because it focuses on ICTs for development in DE. While there are many courses that cover the theory and practice of distance education, I am unaware of another course that specializes in ICTs in this area particularly because the course has been purposefully designed for a developing society context. In this regard, the course is well aligned with UNESCO's primary vision of promoting “Education for All”. The training-the-trainers strategy selected by IITE will have a powerful leverage effect in that sustainability concerns have been taken into account. The course design adopted facilitates delivery in a number of formats ranging from face-to-face workshops to full online delivery. This allows easy adaptation for local conditions and local infrastructure.

Subject to the availability of funding, UNESCO IITE should continue with their activities associated with this project.

As the number of certified trainers increases, establishing a community of practice around the course will enhance sustainability of the project. Social networks that extend beyond national boundaries are powerful vehicles to assist projects like this to develop and sustain their own momentum. Therefore, I strongly recommend the establishment of a virtual network for certified trainers of this course. This could take the form of a web site hosted by IITE that incorporates collaboration and communication tools. In order to measure the ongoing impact of the initiative, it would help to keep centralized statistics concerning the number of prospective students that have received training using the course outside of IITE administered offerings. The community of practice web site could also provide tracking features to keep records associated with subsequent offerings by certified trainers.

**Recommendation 2:** *Commissioning the development of an additional module covering the skills and requirements for developing a sustainable business plan for local delivery of the course.*

During the 2<sup>nd</sup> face-to-face seminar the fundamentals of drawing up a business plan for offering the course were covered. Participants found this to be a challenging exercise yet the majority of participants listed the business plan as one of the most useful components of this seminar. The target audience did not have adequate

skills and experience to draw up a business plan within the time allowed for this component, and clearly this is a skills-gap that should be addressed to promote sustainability of the project.

Without a sustainable business plan, it will be difficult for local providers to ensure ongoing success of the initiative. Moreover, without providing a plan articulating the business drivers underpinning the delivery of the course, it will be difficult to secure funding from the international donor community for rolling out this course in the respective countries. Therefore, I recommend that an addition module should be developed to teach the skills and requirements for developing a sustainable business plan for local delivery of the course.

**Recommendation 3:** *Providing additional training in the use of the Distance Education Platform (DEP) in the role of instructor-administrator of the system.*

The pilot offering of the course covered the practical skills associated with using the DEP as a learner. In addition the pedagogical issues concerning the design of effective online courses were addressed. However, due to technical reasons explained earlier (in the commentary on the evaluation of the 2<sup>nd</sup> Seminar) combined with an extremely tight delivery schedule, it was not possible to provide practical training on the DEP from perspective of an online instructor. For example, in the role of administrator how to create a new discussion forum, post a new voting or set an assignment on the system for students.

While the DEP is an intuitive system with excellent navigation, participants felt uncomfortable that the course was unable to cover these aspects adequately. In this regard I would recommend that IITE develop an instructor and administrator's manual to support the DEP. It is quite possible to design a short online course to teach these skills. In addition, it will also be possible to identify certified trainers to work as co-moderators with an experienced moderator with future offerings of the course.

**Recommendation 4:** *Extending the duration of the online distance education component of the course, as the 6-week period used in this pilot for online activities, was too demanding for participants in full-time employment.*

Most of the participants commented on the exceptionally high demands of this course within the tight timeframes for presentation. As lead facilitator I spent considerably more time on motivational strategies than is usually required of online teaching. This was necessary because of the time pressures when measured against the workload requirements of the course.

Working with a highly committed group it was possible to maintain the exceptionally high assignment submission rate and high levels of participation in the online discussion forums. This was not without numerous motivation e-mails sent to individual participants when I noticed any decline in participation. However, in situations where the course is moderated by less experienced online instructors, increases in drop-out rates is likely. Consequently I recommend that with future offerings of the course that duration of the online component should be extended to a minimum of 2 weeks per module of the course that should be covered during the online period plus an additional two weeks to provide time for assignment preparation.

**Recommendation 5:** *Implementing the refinements identified as a result of the pilot offering of the course using the DEP.*

There are a few minor refinements that should be incorporated into the DEP for this course. These were detailed in Section 3 of the report and will not be repeated here.

## Programme for 1st Face-to-Face Seminar

UNESCO INSTITUTE  
FOR INFORMATION  
TECHNOLOGIES



IITE/TRS1/03/DOC.  
October 2003  
Original: English

IN EDUCATION (IITE)

8 Kedrova St. (Bld.3)  
117292 Moscow  
Russian Federation

### TRAINING SESSION

within the framework of the UNESCO IITE sub-regional project:  
*Information and Communication Technologies  
for Higher Distance Education Usage in Sub-Saharan Africa*

14-19 October 2003, University of South Africa (UNISA), Pretoria

#### TAMETABLE

DATE/TIME	ACTIVITY	PRESENTER/RESPONSIBLE
Tuesday 14 October 2003		
8.30 – 9.00	Registration of the participants	UNISA
9.00 – 9.15	Welcome by UNISA	Institute for Continuing Education Mrs Evelyn Nonyongo
9.15 – 9.30	Indigenous South African Welcome	Appropriate performance from South Africa indigenous group
9.30 – 10.00	Welcome address from UNISA Executive	Senior UNISA executive
10.00 – 10.30	UNESCO IITE sub-regional project <i>Information and Communication Technologies (ICTs) for Higher Distance Education Usage in Sub-Saharan Africa (SSA)</i>	Prof. Valery Meskov
10.30 – 11.00 TEA/COFFEE BREAK		
11.00 – 12.10	Introduction of the participants	Prof. Valery Meskov
12.10 – 12.40	Overview of the course <i>Information and Communication Technologies in Distance Education (DE) in the context of DE and ICTs in SSA</i>	Prof. Wayne Mackintosh
12.40 – 13.00	Overview of the IITE online learning management system (LMS)	Dr Azat Khannanov
13.00 – 14.00 LUNCH BREAK		
14.00 – 15.00	Introduction to main services of IITE LMS. Guide for the participants	Dr Azat Khannanov
15.00 – 15.30 TEA/COFFEE BREAK		

15.30 – 16.30	Learning to use the IITE LMS <ul style="list-style-type: none"> <li>• Login to the system</li> <li>• Updating a personal profile</li> <li>• First discussion forum launch</li> </ul>	Prof. Wayne Mackintosh Dr Azat Khannanov
	<b>Module 1.</b> Assignment 1.	
16.30 – 17.00	Homework for Day 2: <b>Module 1.</b> Readings for Unit 1.	Prof. Wayne Mackintosh Dr Bob Day
<b>Wednesday 15 October 2003</b>		
8.30 – 9.00	Morning coffee and tea	
9.00 – 9.30	Posting homework on discussion forum	Prof. Wayne Mackintosh Dr Bob Day
9.30 – 10.00	<b>Module 1.</b> A critical analysis of the concept of DE	Prof. Wayne Mackintosh
10.00 – 10.30	Group discussion: <ul style="list-style-type: none"> <li>• Whether the definition of DE should be refined as a result of the advances in ICTs?</li> </ul>	Prof. Wayne Mackintosh Dr Bob Day
<b>10.30 – 11.00 TEA/COFFEE BREAK</b>		
11.00 – 11.30	Introduction of the web–mail feature of the IITE LMS	Prof. Wayne Mackintosh Dr Azat Khannanov
11.30 – 12.00	Activity to practice the web–mail feature of the IITE LMS	Prof. Wayne Mackintosh Dr Azat Khannanov
12.00 – 12.30	The philosophy of open learning and its relationship to DE	Prof. Wayne Mackintosh
12.30 – 13.00	Online discussion forum activity (personal definitions of DE, giving reasons for changing or not)	Prof. Wayne Mackintosh Dr Bob Day
<b>13.00 –14.00 LUNCH BREAK</b>		
14.00 – 15.00	Brain research and strategic potential for ICTs to enhance learning	Dr Bob Day
<b>15.00 –15.30 TEA/COFFEE BREAK</b>		
15.30 – 16.30	Group discussion on the similarities and differences of face–to–face education and DE	Prof. Wayne Mackintosh Dr Bob Day
16.30 – 17.00	Homework for Day 3: <b>Module 1.</b> Readings 1 and 2 of Unit 2	Prof. Wayne Mackintosh Dr Bob Day
<b>Thursday 16 October 2003</b>		
8.30 – 9.00	Morning coffee and tea	
9.00 – 9.30	Group discussion: <ul style="list-style-type: none"> <li>• Fundamental changes to face–to–face provision as a result of ICTs</li> <li>• Fundamental ways ICTs are likely to change DE provision</li> </ul>	Prof. Wayne Mackintosh Dr Bob Day

9.30 – 10.00	Group discussion: • Will ICTs result in the convergence of face-to-face and DE?	Prof. Wayne Mackintosh Dr Bob Day
10.00 – 10.30	Nipper's generations of DE and the application of S-curve analysis in DE	Prof. Wayne Mackintosh
10.30 – 11.00	TEA/COFFEE BREAK	
11.00 – 12.00	Massification of education and the mega-university experience. (Summary of the Daniel and Mackintosh reading)	Prof. Wayne Mackintosh
12.00 – 13.00	Onsite visit to UNISA's Production and Dispatch	UNISA
13.00 – 14.00	LUNCH BREAK	
14.00 – 15.00	The digital divide and the African e-campus	Dr Bob Day
15.00 – 15.30	TEA/COFFEE BREAK	
15.30 – 16.30	Group Activity comparing the Telesecundaria Project and the African Virtual University. (Advantages and disadvantages of the respective project and identifying features that could be incorporated in the African context)	Prof. Wayne Mackintosh Dr Bob Day
16.30 – 17.00	Homework for Day 4	Prof. Wayne Mackintosh Dr Bob Day
Friday	17 October 2003	
8.30 – 9.00	Morning coffee and tea	
9.00 – 9.30	Introducing the webliography feature of the IITE LMS	Prof. Wayne Mackintosh Dr Azat Khannanov
9.30 – 10.30	Group Activity. Searching the web for a valuable resource in DE, and preparation of a short summary on why the resource is considered useful	
10.30 – 11.00	TEA/COFFEE BREAK	
11.00 – 12.00	The role of student support in distance education. (Presentation by UNISA Student Support Representative)	Thandi Ngegibule
12.00 – 13.00	Group work. <b>Module 2.</b> Assignment 4 of Unit 1	Prof. Wayne Mackintosh Dr Bob Day
13.00 – 14.00	LUNCH BREAK	
14.00 – 15.00	Group work. (Participants to prepare questions for the administrator's panel discussion on the next day. Participants should also summarize how they would answer the questions)	Prof. Wayne Mackintosh Dr Bob Day

15.00 – 15.30			TEA/COFFEE BREAK		
15.30 – 16.30	Group feedback on the questions and proposed answers (Selection and prioritization of questions to be put to the panel)	Prof. Wayne Mackintosh Dr Bob Day			
16.30 – 17.00	Homework for Day 5: Module 2. Assignment 3, Unit 2	Prof. Wayne Mackintosh Dr Bob Day			
Saturday			18 October 2003		
8.30 – 9.00	Morning coffee and tea				
9.00 – 9.30	Posting homework on discussion forum	Prof. Wayne Mackintosh Dr Bob Day			
9.30 – 10.30	Panel members are to introduce themselves and their organisations. Suggested Panel to include the following members: <ul style="list-style-type: none"> <li>• UNISA</li> <li>• Technikon South Africa</li> <li>• South African Institute of Distance Education</li> <li>• SA Ministry representative</li> </ul>	Representatives of the organizations			
10.30–11.00			TEA/COFFEE BREAK		
11.00 – 12.00	Panel discussion based on the questions prepared by the participants the day before	Prof. Wayne Mackintosh Dr Bob Day Dr Azat Khannanov			
12.00 – 12.30	Overview of the online component Seminar evaluation	Prof. Wayne Mackintosh			
12.30 – 12.45	Conclusion and closing address	Senior UNISA executive			
12.45 – 13.00	<b>Closing of the training session</b> Conclusion and reflections	Prof. Wayne Mackintosh Dr Bob Day Dr Azat Khannanov			
13.00 – 14.00			LUNCH		



## Programme for 2nd Face-to-Face Seminar

UNESCO INSTITUTE  
FOR INFORMATION  
TECHNOLOGIES



IITE/TRS1/03/DOC.  
November 2003  
Original: English

IN EDUCATION (IITE)

8 Kedrova St. (Bld.3)  
117292 Moscow  
Russian Federation

### TRAINING SESSION

within the framework of the UNESCO IITE sub-regional project:

*Information and Communication Technologies  
for Higher Distance Education Usage in Sub-Saharan Africa*

8-13 December 2003, University of South Africa (UNISA), Pretoria

The aims of the second face-to-face seminar are:

- To continue building on the network of support relationships across national boundaries that were established during the first face-to-face seminar and the online activities over the past weeks. These relationships will assist participants in rolling out the provision of this course in their own respective countries;
- To receive feedback on the online activities since 18 October 2003 — the first face-to-face seminar;
- To complete Module 6 of the specialised training course;
- To draft a business plan for the presentation of this course in the participant's home country;
- To avail of the opportunity of the South African visit to interact with South African distance education practitioners regarding a range of DE policy issues;
- To receive training and support in aspects relating to the online delivery of this course;
- To evaluate the pilot offering of this specialised training course;
- To receive certification for the successful completion of this course.

#### TIMETABLE

DATE/TIME	ACTIVITY	PRESENTER/RESPONSIBLE
Monday		
8 December 2003		
8.30 – 9.00	Registration of the participants	UNISA
9.00 – 9.15	Welcome back to UNISA	Institute for Continuing Education Mrs Evelyn Nonyongo
9.15 – 9.45	Welcome address from UNISA Executive	Senior UNISA executive to welcome delegates
9.45 – 10.00	Video address if available	A short video (Either Prof. Michael Moore or Prof. Vladimir Kinelev)

**PILOT OFFERING UNESCO IITE SPECIALISED TRAINING COURSE "INFORMATION AND COMMUNICATION TECHNOLOGIES IN DISTANCE EDUCATION"**

10.00 – 10.30	UNESCO IITE vision for the specialised training course: <i>Information and Communication Technologies in Distance Education</i>	An overview summarizing UNESCO IITE's view of how this course could potentially be used in the future. Recommendations for consideration Prof. Valery Meskov
10.30 – 11.00 TEA/COFFEE BREAK		
11.00 – 12.00	Moderator's feedback on Part 2 (online activities) of the course	This will cover the moderator's reflections on Part 2 of the course as well as generic feedback on Assignment 1 and Assignment 2 (Computer Lab) Prof. Wayne Mackintosh
12.00–13.00	Responding to participants' expectations for the 2nd face-to-face seminar concluding with the aims for the seminar	An interactive session discussing participants' suggestions for 2nd face-to-face seminar and how they have been accommodated in the seminar programme (see relevant online submissions) (Computer Lab) Prof. Wayne Mackintosh
13.00 – 14.00 LUNCH BREAK		
14.00 – 15.00	Africa's achievements with ICTs for development – examples and case studies. (In response to requests from participants)	This presentation will draw on the research work of the e-campus initiative providing examples of ICT successes in Africa (Computer Lab) Dr Bob Day
15.00 – 15.30 TEA/COFFEE BREAK		
15.30 – 16.30	What have we learned from Africa's experience with ICTs with particular emphasis on the policy implications for the e-university in Africa?	An interactive session exploring key policy questions for Africa regarding DE and ICTs (Computer Lab) Dr Bob Day
16.30–17.00	Homework for Day 2: <b>Module 5.</b> Selected reading for Unit 2. <b>Module 6, Unit 1, Reading 1</b>	Dr Linda Black Prof Wayne Mackintosh
Tuesday 9 December 2003		
8.30 – 10.00	Workshop on the disabled learner and DE	Dr Linda Black
10.00 – 10.30	Posting of Homework on the Module 6 Reading	Prof. Wayne Mackintosh
10.30 – 11.00 TEA/COFFEE BREAK		
11.00 – 12.00	Summary of: • The Juma paper: From traditional distance learning to virtual distance learning in higher education in Africa: Trends and Challenges • The African Virtual University and the Telesecundaria Project	This will form the basis for a class debate on the African Virtual University as a model for the future of distance education in Africa  (Computer Lab) Prof. Wayne Mackintosh
12.00 – 13.00	Small group work preparing for the debate: The "AVU is the model for the future of virtual learning in Africa"	Participants are divided into two groups. One group argues the affirmative while the other argues against (Breakaway venue)

13.00 – 14.00 LUNCH BREAK		
14.00 – 15.00	Debate on “The AVU is the model for the future of virtual learning in Africa”	Debate Chair: Dr Bob Day (Computer Lab)
15.00 – 15.30 TEA/COFFEE BREAK		
15.30 – 16.30	Small group work on Trends and Policy Implications (See Assignments 3, 4, 5 and 6 of Module 6, Unit 1)	Participants are divided into 4 groups. Each group is allocated one of the trend groupings associated with the relevant assignments. In each case from the list of trends, the group must identify the two most important trends with regards to the African situation. The group must justify their selection in each case  (Breakaway venue) Prof. Wayne Mackintosh Dr Linda Black Dr Bob Day Dr Yuriy Zaporavany
	Homework for Day 3: <b>Module 6.</b> Unit 1, Read the introduction and Answer Assignment 1 on page 101 <b>Module 6.</b> Unit 2, Reading 1	Prof. Wayne Mackintosh
Wednesday 10 December 2003		
8.30 – 9.00	Verbal feedback on Trend & Policy activity	Prof. Wayne Mackintosh (Computer Lab)
9.00 – 9.30	Posting of homework on the discussion forum	Prof. Wayne Mackintosh (Computer Lab)
9.30 – 10.30	Group work. (Participants to prepare questions for the administrator’s panel discussion on the next day. Participants should also summarize how they would answer the questions)	Prof. Wayne Mackintosh Dr Linda Black Dr Bob Day Dr Yuriy Zaporavany (Breakaway venue)
10.30 – 11.00 TEA/COFFEE BREAK		
11.00 – 12.00	Developing a business plan for local presentation of the training course: ICTs in Distance Education.	Overview of the business plan blueprint (Computer Lab) Prof. Wayne Mackintosh
12.00 – 13.00	Case Study of a potential application of the course in Ghana	Dr. Theophilus Aquinas Ossei–Anto
13.00 – 1400 LUNCH BREAK		
14.00 – 15.00	Writing up a project definition	Completing Activity 2.1.1 and 2.1.2 of the Business Plan Guide (Computer Lab) Prof. Wayne Mackintosh
15.00 – 15.30 TEA/COFFEE BREAK		
15.30 – 16.30	Writing up the project motivation and justification focusing on aspects that are considered important by international donors	Completing Activity 2.2.1 of the Business Plan Guide (Computer Lab) Prof. Wayne Mackintosh Dr Bob Day Dr Linda Black

	<p>Homework for Day 4 Go over questions for Panel Discussion Jot down the main features of the delivery model for your project including the selection of technology and duration of the course</p>	<p>Prof. Wayne Mackintosh Dr Bob Day</p>
<p>Thursday 11 December 2003</p>		
9.00 – 10.30	<p>Panel Discussion on Policy Issues in DE <b>Panel Members:</b></p> <ul style="list-style-type: none"> <li>• Prof. Narend Bajinath (Vice Principal Planning and Development TSA)</li> <li>• Representative from SAIDE</li> <li>• Prof. Louis Molamu (Registrar, UNISA)</li> <li>• Prof. Antony Melck (Advisor to the VC, University of Pretoria)</li> </ul>	<p>Chair Prof. Wayne Mackintosh (Venue to be announced)</p>
<p>10.30 – 11.00 TEA/COFFEE BREAK</p>		
11.00 – 12.00	<p>Completing the target audience analysis and descriptions of the following components of the delivery model:</p> <ul style="list-style-type: none"> <li>• Presentation of content</li> <li>• Interaction strategy</li> </ul>	<p>Completing Activities: 2.4.1; 2.5.1 and 2.5.2 of the Business Plan Guide. (Computer Lab) Prof. Wayne Mackintosh Dr Bob Day Dr Linda Black</p>
12.00 – 13.00	<p>Designing an assessment strategy for the course</p>	<p>Completing Activity 2.5.3 of the Business Plan Guide. (Computer Lab) Prof. Wayne Mackintosh Dr Bob Day Dr Linda Black</p>
<p>13.00 – 14.00 LUNCH BREAK</p>		
14.00 – 15.00	<p>Planning for Web Delivery of Distance Education</p>	<p>(Computer Lab) Dr Linda Black</p>
<p>15.00 – 15.30 TEA/COFFEE BREAK</p>		
15.30 – 16.30	<p>Posting an online roadmap for your course, which should include, for example:</p> <ul style="list-style-type: none"> <li>• Welcome to students</li> <li>• Overall aims of the course</li> <li>• Assessment strategy</li> <li>• Timeline for presentation</li> </ul>	<p>Prof. Wayne Mackintosh, Dr Bob Day Dr Linda Black</p>
	<p>No homework</p>	
<p>Friday 12 December 2003</p>		
8.30 – 10.30	<p>Developing a budget for the project (Projected costs and revenue)</p>	<p>Prof. Wayne Mackintosh</p>
<p>10.30 – 11.00 TEA/COFFEE BREAK</p>		
11.00 – 12.00	<p>Facilitating Your First Online Course</p>	<p>(Computer Lab) Dr Linda Black</p>
12.00 – 13.00	<p>Designing and posting example threads</p>	<p>(Computer Lab) Dr Linda Black</p>

13.00 – 14.00 LUNCH BREAK		
14.00 – 15.30	Evaluation of Seminar	(Computer Lab) Prof. Wayne Mackintosh
15.30 – 16.30	<b>Closing of Training Session</b> <ul style="list-style-type: none"> <li>• Closing Address by UNISA Executive</li> <li>• Conclusion and reflections by participant's representative</li> <li>• The way forward – UNESCO IITE</li> <li>• Presentation of Certificates</li> </ul>	Chair: Evelyn Nonyongo (Venue to be announced)
16.30 – 17.30 Cocktails and goodbyes		
Morning	Organized Tour to Soweto	Institute for Continuing Education to arrange

## Written Assignments

### Written Assignment 1

**Due:** 26 October 2003

Your written assignment is based on:

- Assignment 3, Unit 2 of Module 1;
- Assignment 4, Unit 1 of Module 2; and
- Assignment 4, Unit 2 of Module 2.

#### Purpose

The purpose of this assignment is to propose a national DE solution for your own country, or alternatively a proposal describing how you might change the way DE is organized on your own country. A key requirement of this assignment requires the innovative application of digital ICTs to overcome the barriers of the existing digital divide.

#### Required

A short essay (1800 to 2000 words - about six or seven typed A4 pages) proposing a national DE strategy that incorporates innovative applications of ICTS to overcome the digital divide. In this essay you will need to describe or address the following:

- Current situation of HE in your country. Provide a summary of higher education in your country, for example, the gross enrolment ratio, number of universities, number of students participating in HE, the extent of DE provision; and dominant delivery models used for DE;
- Barriers or constraints pertaining to technology-enhanced distance education in your country. Here you will need to consider, for instance, the levels of access to different forms of technology; national policy barriers; social and cultural barriers etc.;
- Proposals for the future of technology-enhanced DE in your country. In this section you must explain your proposed national DE strategy, including how the strategy will overcome the barriers listed above in a sustainable way.

Prepare your assignment off-line using MS-Word, or word processor of your choice (but make sure you save this in rich text format (rtf). Using the file exchange feature of this online learning environment upload your file in the relevant section.

### Written Assignment 2

**Due:** 23 November 2003

Written assignment 2 is based on you experiences working on Module 3. It is divided into two parts.

#### Part 1

In preparation for Part 1 of this written assignment, you must read through Unit 1 of Module 3 again in your course materials. Then you must submit a written answer to *Assignment 3, Unit 1 of Module 3*. You will find the question on page 51 of your printed materials alternatively you can read the relevant section online. This is the assignment based on preparing a debate on the pros and cons of using ICTs for distance education in a developing society context. The idea is to consider views from both sides of the spectrum.

## Part 2

Part 2 of this written assignment is based on *Assignment 3, Unit 2 of Module 3*. This assignment is designed to simulate the design and development decisions of an individual course. You will find the question on page 57 of the printed materials alternatively you can read the relevant assignment question online.

I look forward to reading your responses. Again, you are free to work collaboratively on this assignment with fellow participants of your choice. I would recommend contacting your local counterpart in your own country.

Remember to include your names on the assignment submission so that I know who worked on the assignment.

Good luck.

## Assignment 3

**Due:** 7 December 2003

*This is the final written assignment for this course. It is a compulsory assignment for every participant and your answers will be used extensively during the second face-to-face seminar.*

Your answers must be submitted in two formats:

1. As individual postings in the relevant sections of the discussion forum created for Assignment 3. (This is to enable participants to benefit from your thoughts and experience.) Remember to label your posting clearly in the title field, for example, Wayne's answer to question 1.2.
2. As a single document containing your answers to each of the sub-questions of the assignment. You will need to submit this file using the assignments link. (This will enable me to allocate your marks for this assignment within the system.)

Note: You don't need to retype your answers for the two formats above. I suggest that you open an assignment file, and as you complete each answer, you can cut and paste the relevant text into your discussion forum posting.

## Overview and purpose

Our focus in this assignment shifts to the actual planning for the presentation of the UNESCO IITE specialised training course *Information and Communication Technologies in Distance Education* in your own country. This assignment serves the dual purpose of:

- studying the relevant sections of your course material; and
- working on the actual planning for the presentation of this course in your own country.

## Question 1

In this question you must conduct a needs analysis of the students for the presentation of the IITE specialised course in your own country. In other words, you need to think about the students that will enrol for the presentation of this course in your own country.

Read through the introductory section of Unit 1 of Module 5 then complete the student profile table of Assignment 2 on page 80 of your course materials (Assignment 2, Unit 1 of Module 5). Remember — these are the students that will be taking the *Information and communication technologies in distance education* course in your own country.

### 1.1 Demographic factors

Complete the relevant section in the table

### 1.2 Situational factors

Complete the relevant section in the table



**1.3 Learning factors**

Complete the relevant section in the table

**1.4 Resource factors**

Complete the relevant section in the table

**Question 2**

Question 2 is based on a variation of Assignment 2 of Unit 2 in Module 4 (see page 72 of your printed course materials).

I would like you to consider the appropriateness of the following delivery systems for the presentation of the IITE specialised training course in your own country:

- 2.1 predominantly using a print-based delivery system
- 2.2 predominantly using a video-based delivery system
- 2.3 predominantly using an audio-based delivery system
- 2.4 predominantly using a computer-based delivery system

In each case you are required to evaluate the appropriateness of the delivery system using the ACTIONS acronym described on page 73 of your course materials (see Unit 2 of Module 4).

Best of luck with this assignment. This is a real project that should ultimately result in the successful presentation of this course in your own country. Have fun.

## Participants' Evaluation of the 1st Face-to-Face Seminar

*Note: In accordance with accepted practice of qualitative research, students' comments provided have not been edited. In addition it must be emphasised that the majority of participants were communicating through the medium of a second or third language.*

### Question 1: Understanding the evaluation context.

*Please summarise the main reason(s) why you participated in this seminar.*

- I participated because I believe DE is going to be vital in opening up access to education to the majority of deserving Africans, who currently cannot join the conventional HE systems.

- I participated in the seminar because I would like to part of group that will build capacity in DE ICTs in Africa.

- I needed the online learning skills of which I very thankful that I now know by doing.

I participated in this course because I needed some understanding of using ICT's in D.E. as I plan to introduce this in our D.E. programme. Further, I needed to acquire some confidence myself in using ICT's.

- Mainly because it will help me have a better idea of the ICTs that are implemented in distance Education and also have more practical experience of how online distance education can be conducted.

- The main reason I participated is as follows:

To learn how ICT and related technologies can enrich DE. The reason for this is that we have recently launched DE mode in our university and I am convinced that if properly set up ICTs can expand the scope and improve the quality of DE.

- Mainly because, I wanted to be conversant with the basics of on-line courses since the University of Education, Winneba (UEW) Ghana intends to add the on-line option to our distance education delivery modes in 2004.

- My main reason for participating in this seminar was to update my personal awareness and that of the institution I work with on current thinking and practice in ICTs for DE. Given the position my institution occupies in the national education system, I suppose this increased awareness would then have ripple effects on the nation's thinking and practice.

- To have capacity building on the Distance Education and to roll it over in my country.

To be familiar with the on line assessment or assignment procedures to be able to answer all questions sent to me on this course.

Having grasped the procedures the process will be passed over to the other lecturers/teachers to use.

- I hope to gain first hand experience in running/using online teaching/learning. I would like this course to make one of the modules of the 10 modules in the masters of education in the use of ICT.

- The Seychelles will officially launch its national policy on Distance/Open learning and my centre will have the responsibility for overall coordination and management of DE. This will entail several major activities including training of trainers. This seminar presented a golden opportunity for learning and training since I will be a key person in the training of trainers locally. This seminar acts as a catalyst.

- Participating in this programme is one of the mechanisms we have set in place as part of that training process. My Institute (ICE, UNISA) is often involve in a series of projects that I feel I can participate in them more effectively after receiving completing this UNESCO programme.

- Seychelles National Institute of Education (NIE) is is currently negotiating with overseas institutions to offer degree level courses for teachers through the distance mode. For me it is necessary to acquire knowledge and skills necessary to train others.

- To gain insight into the theoretical foundations of Higher Distance Education as an academic field and to acquire the necessary understanding, knowledge and skills of how ICTs can be used to enhance service delivery, student support and learning in DE. Further, I also wanted to establish networking with other professionals in the region of SSA and abroad who are currently involved in DE. With the above, I would be able to go back and report to my organization so that an agenda for action would be developed by involving other stakeholders.

- Since this was my first exposure to a seminar of this kind, ICTs in DE, I had no prior expectations, but was receptive and open to learn what was offered. I see this seminar as a platform, that has to be contextualised and modified to suit our purpose back at home. What I was exposed to in terms of the aims of this seminar was a bonus. I should be able to make a difference in my country. We are living in a fast moving and dynamic world, and if you do not want to stagnate, in terms of keeping up with the technological advances, you should be prepare to move on- I identified this opportunity as such.

## **Question 2: In what ways has the seminar satisfied your expectations?**

- One of my expectations was to have a hands-on experience in studying online. To a greater extent, this seminar has met this expectation.

- The seminar has given me a chance to reflect on DE practices in my country particularly with respect to the use of ICTs.

- Through the course reader and the review of articles and other online resources, I've gained insight into the theoretical foundations of DE that I did not possess previously as I recently joined DE as a practitioner.

- Through the daily formal and informal interactions with fellow participants and moderator/s, I have had the opportunity to establish networks with other professionals in the field across the SSA region and elsewhere.

- Though this seminar is not the first online course I had done, through the daily readings, presentations and online activities, I have acquired the necessary knowledge and understanding particularly of how ICTs can be used to enhance service delivery and in DE.

- I have developed a better understanding of DE and its relevance to the Sub Saharan African context. I now appreciate the vital role digital ICTs would play in carrying forward (facilitating the realization of) the DE agenda in Africa. This seminar enabled me interact with colleagues from various parts of Sub Saharan Africa, and appreciated each others' situations/challenges/problems.

- I have found the LMS very powerful and it showed us that the future of DE can very much rely on this kind of technologies. I was interested to how the online training would be conducted and I'm very much happy with what I saw.

- I now appreciate more the value and potential of digital ICTs as tools to enhance DE.  
I found the information on open source-ware potentially very useful especially to resource poor universities. The choice of having the workshop in UNISA was very good. It gave some of us an opportunity to see Mega University and appreciate the complexities involved.

- The seminar did satisfy my expectations in that I learned:
  - How to learn online and interact with other participants online
  - The current debates on Distance Learning and ICTs
  - The major issues relating to traditional universities and distance learning universities.
- This seminar has satisfied my expectations in the following ways:
  - I've had opportunity to take the Readings provided by the presenters, and this have greatly improved on my awareness of current thinking and practice in the area of digital ICTs for DE.
  - It gave me the opportunity to dialogue with colleagues and the facilitators on controversial aspects of the field and thereby clarified my thinking.
- It is a great opportunity to attend a course moderated by the top people in the field.  
I now have a better understanding of the various schools of thought around DE.  
I never had the time to study online course. I was given the opportunity to see how it works.

- My expectation was to receive sufficient training to enable me to train others. The seminar has partly fulfilled this expectation since we will still be in training until the completion of the course. However, I have acquired substantial skills and knowledge in this seminar and this will enable me to cope successfully when I am back home. I am also learning a lot through ideas from my fellow course participants. My belief is that the discussion forum is a powerful learning and motivation tool.

- I feel that I have learnt a lot in the short period of time. Useful skills in terms of navigating myself around the net for specific reasons.

- It has been a very enriching experience both in terms of knowledge on DE and skills development in computing.

- I have learnt a lot on the use of ICT in Distance Education and I see this kind of knowledge will be of great assistance to me and the development of my Institution.

- I now have a much broader, and richer understanding of the value and use of ICT's in DE. Keep in mind that I am long in DE, rather in the formal educational system. All the discussions about the definition of DE has changed some of the fundamental perspectives I use to have on this topic.

I am fully aware of UNESCO's role, and their vision with regards to education, especially in the SSA context. I am confident and will be able to use the skills that I have acquired by this seminar.

The fundamentals, philosophies, history and future of DE that has gone into depth and breadth, enhanced my knowledge, and challenged my cognitive capacities. From my point of view this seminar was enriching, insightful and answered the aims that was predetermined.

### **Question 3: In what ways did the seminar NOT meet your expectations?**

- One of my expectations was to be able to have a go at designing an online course. Although this was discussed in the seminar, it was not given enough time (especially giving participants a hands-on experience).

- Given that DE is in its infancy in the Seychelles I find it difficult to state some of my expectations which have not been met. However, in the near future I will be required to design courses so it will be good to have a bit more practice or techniques for designing on line courses although this was not an objective of this workshop.

- If we have to go back after the follow up course in December, I think it is of vital importance that we should be empowered to render support to students or learners online. I see this pilot seminar as an introduction, and that we will be able to have more practice on this in the next round.

- The majority of my expectations were met. However, the seminar should have given us the opportunity to share knowledge on the state of ICTs in our home countries so that we would also share thoughts on

implementation strategies. This was done outside of the seminar one on one NOT with everyone.

- I appreciate the fact that this might come later in the training, although I would have expected the meeting to help start us start thinking loudly about the role-out of the programme in our respective countries. We might also have started addressing some of the challenges we must expect in this role-out, especially with respect to the wanting ICT situation in the various countries.

- I was expecting a more discussion and training on the technical aspect. As the title of the training implies, the ICT aspect of DE should be emphasised rather than DE. I hope to see more topics and discussions on ICTs in the other modules. Topics like the technologies implemented in developing DEPs and hands on trainings and so on, should be covered.

- The title of the course is "Information and Communication Technologies for Higher Distance Education Usage in Sub Saharan Africa", and this, to me, implies a course that will deal with ICT usage, particularly the new digital technologies. As we only used the computer technology, I feel that the usage of the other ICT's was missing. We should be taught the other existing ICT's, and maybe, this could be arranged during the next session in December 2003.

- The seminar has been an enriching experience both in terms of knowledge and computing skills development. It has been an exciting exploratory venture. Therefore, I can confidently say that the seminar even went beyond my expectations.

- I had also hoped that before the end of the workshop the participants will be formally given the platform to discuss how they would like to see the programme progressing between now and December given that we were told that the programme is a pilot and the process that we should own and move forward with.

On the whole the seminar met my expectations. However, more work should have been done on the procedure to send assignments done to get us well acquainted before going back. Nevertheless, what has been achieved could be worked on to go through the work.

- Time did not allow for quality group discussions with fellow participants, some of whom had rich experiences from which we could have gained much. Social interaction was also limited and yet this would have served to strengthen bonds among the learners and between the learners and their tutors so as to add a human feel to the period of 'a class on the web' between the two seminar sessions.

- My expectations were well met and I was really impressed by the presentations. However we should have ample time to practice the Web communication at our Countries especially during our online assignments. Some of us with poor infrastructure need an assistance to meet that.

- All my expectations were met in the face to face seminar. However it would be good to have a few computers at the guest house for the week to help the group practice further. In addition, i would suggest that the organizers get more lasting bags and name tags which show the participants country of residence.

- For me the workshop was partly a revision with regard to DE theory, which was useful, however, I expected to have more hands-on techniques on ON-LINE. Since the course is about ICTS in DE, I think it will be useful for the course to focus on the actual design of an ON-LINE COURSE.

**Question 4: Indicate your overall rating of the seminar using the following scale:**

- 1 = Excellent (13)
- 2 = Good (5)
- 3 = Satisfactory
- 4 = Poor (1)

- A very good combination of theory, discussions and practices.

- I would rate the seminar as excellent especially in the professional way in which material was presented by the facilitators.

- Again I see the seminar as the beginning of the process that stretches officially untils December 2003. Thereafter the real success for me would be if we, the participants can use the knowledge we have acquired to inform/improve policies and practices in our different contexts. I would say the seminar was good.

- In terms of the pre-determined seminar objectives, the seminar achieved between good and excellent. But in terms of including participants' input on what the seminar should have addressed, I would give it poor.

### **Question 5: How would you rate the administrative arrangements for the seminar using the following scale?**

- 1 = Excellent (5)
- 2 = Good (10)
- 3 = Satisfactory (2)
- 4 = Poor

- Generally some of the administrative aspects were well done including e-mail communication before coming to SA-UNISA, the Airport reception and transport to UNISA and To JNB airport and others. I thank very much for all hospitality done by the Organizing Committee. Experience and feedback makes perfections.

- All involved have done their utmost to ensure that everything goes smoothly. Except for the problem on transportation I would rate the arrangements excellent.

- There were some slight problems with communication and with some administrative arrangements for the participants.

- Our needs were attended to, thanks to the staff at UNISA, and the course leaders. Thank you.

### **Question 6: List the aspects you found most valuable in the seminar.**

- The practical aspects on online learning. Group discussions on DE and ICT. Interesting and well articulated lecture presentations on DE, ICTs, Brain, futureristic outlook, and UNISA's experiences on Student Support services.

- Relating how the brain works to the use of ICTs. Group discussions on DE and the use of ICTs. Hands-on exercises on the use of the platform.

- The presentations by the various facilitators were excellent. The assignments were very focused, and ensured that participants concentrate on the various aspects of the course.

The training materials were readily available, and easy to understand and follow.

Equipment, including the computers, software used, and Internet connection, were super.

Fellow participants were jolly and ready to assist.

- Presentations by the different facilitators were excellent. The good balance between talk and practical. Materials provided are very useful. On-line practical activities.

Presentation/discussions on DE. Eagerness of participants to share their experiences and notably staff of UNISA. The way the workshop was conducted, especially the hands-on exposure. The "hard-copy" literature provided is going to be very useful when we return to our home-countries.

The facilitators displayed a high level of qualification and this was very encouraging.

- The introduction of the LMS. Resources that were distributed during the seminar and electronic resources in the LMS.

- The aspects that I found most valuable were:

- The choice of readings for the Seminar.
- The hands on experience and practical nature of the course.
- The discussions of the complex (and sometimes confusing) issues in Distance Education.
- The tours to the Printing and Despatch areas and to the Library.

- The practical applications of the theoretical aspects. The design of the course. The opportunity for interaction.

- The various schools of thought, practicing DE for the last six years. It was very interesting to see how different people see DE in different ways. Scalability model of DE, and the concept of education as industrialized process. The feel of the online learning. The resources made available for support of the course. The presentation on the brain research has also given me a new dimension to reflect on education.

- The aspects I found most valuable are:

- Ability to learn how to use the online package.
- Being able to learn in a lab was very ideal.
- Learning with colleagues from many countries and sharing views on DE and ICTs.
- Having the second opportunity/privilege to learn from such renowned facilitators.
- Holding the seminar at UNISA was a good idea because we were able to see some aspects of DE in real life.

- The presentations by facilitators were excellent and insightful. I learned so much that I did not know before. Presentations also got me thinking about the state of the art in my country. Facilitators were very lively, knowledgeable and experienced.

We had access to all training equipment and materials needed and were warmly welcomed by NISA.

We were comfortable with one another and team spirit was very quickly apparent.

This whole seminar in effect has been an invaluable experience.

I found the following aspects most valuable:

- The expert presentations and the discussions that followed.
- The hands-on practice on the instructional platform under development.
- Features of the platform like the clear plan (Arrangements) for the course, Readings, the Web Library, Discussion forums, etc.
- Practical examples from other DE practitioners on ICT usage for pedagogical and support services.

## **Question 7: Suggestions for improvement.**

- I suggest that in future, the first face-to-face seminar must focus more on the practical use of the online platform than the theory about DE. My suggestion is based on the fact that there is a possibility for some participants not to have much computer skills.

- If it were possible, the next meetings could be rotated amongst the participating countries, so that it does not look like UNISA is the role model (UNISA is a bit intimidating, and participants could be forgiven if they felt a bit like we are trying to implement UNISA in all the countries).

- I feel that you have done very well. However it will be very difficult to please everyone for we all have a different background. Honestly I enjoyed the balance between DE and on-line training. Reading is essential but if possible let us know the reading list before we come to the workshop. I don't think it can get better than this.



The only thing we should avoid diversion of topics during discussions. The facilitators should lead the students back to the topics raised when this happens.

- Improve the management of group discussions.
- Have at least one online feedback from instructor to student. The student in this seminar submitted quite a number of responses it will complete the loop if they receive some feedback.
- My suggestions for improvement are:
  - The course should also cover the other new digital ICT's and not only delve on computer technologies.
  - Participants should be given adequate time to post in their responses, and these responses should be discussed to see which ones were in order and which ones were not. When the responses are not discussed, it leaves the participants with questions as to whether their responses were on the right track or not.
  - As some of us are looking at introducing these ICT's in our programmes, an idea about the costs of each one of them could have been helpful.

- The seminar was too tight. A little bit of room for relaxation would have done the trick. In effect an additional day or two would have been appropriate.

Regular seminars of this nature is welcome either on line or face-face to upgrade our knowledge on current issues on DE.

- Hard copies or e-copies should have been made available after every presentation to help us go through before the next session so that issues in them could be raised in the following days work.

- The programme may be posted online beforehand for the participants so that they can start familiarising themselves with the aspects they may not be familiar with in preparation for the seminar. You can for example, post key concepts and a short list of key theorists beforehand assuming that participants will have the time for a quick pre-seminar refresher.

Generally, the face-to-face seminar good, given that it is a pilot. I feel that a lot of thought and planning has gone to putting together a dossier of enabling resources for participants.

- I felt the way face to face sessions were excellently done that I don't have any suggestions that would make more miracles. It would be good to have hard copies available as soon as the presentation is made to enable immediate follow up. I note that most were available in the training manual which was helpful.

- My main concern is with the readings. I find that some readings are too lengthy and some too technical e.g. Dede's article. I don't see how someone who knows very little about these new ICT's and developments will be able to fully understand articles such as this one. On the other hand, other articles are very informative and interesting but my fear is that the length will very easily put people off.

- The timetable was too compact. We were mentally exhausted at the end of each day and it became difficult to concentrate on homework. May I suggest that the activities are spread out a bit more for the oncoming seminar.

Otherwise, great!

- More hands work required for technical aspects.

Consider giving more time on the course tools, for instance how to set up a similar course using OPEN SOURCE softwares.

Build in time for participants to share their experiences on what works and the challenges faced in home countries to share strategies.

- The following suggestions could improve future seminars:

- Readings should be dispatched to participants earlier so that more time is spent on discussions with the experts and among participants rather than on presentations.
- An excursion to a smaller provider, possibly a dual mode institution much similar to a number of participants' backgrounds could be more enriching than the intimidating mega UNISA.

- This session of Face to Face was excellent, but may be a lot of Online practises should be done to equip well the participants with ICT skills.

If we can have more time to do our readings, because reading it once is sometimes not enough, especially if you are tired.

If we can discuss our postings, to know whether we are on the right track.

I acknowledge the fact that immediate feedback is not always possible, since we are many, and you need time for that.

## Participants' Evaluation of the 2nd Face-to-Face Seminar

*Note: In accordance with accepted practice of qualitative research, students' comments provided have not been edited. In addition it must be emphasised that the majority of participants were communicating through the medium of a second or third language.*

### Question 1

Please provide us with an overall rating of the 2nd face-to-face seminar using the following rating scale:

- 1 = Excellent (14)
- 2 = Good (4)
- 3 = Satisfactory (0)
- 4 = Poor (0)

- We did not have hands-on in the technical aspects like creating our own threads as teachers, and the associated web-management dynamics.

- The second face-to-face seminar has gone on very well with all the topics been carefully tackled. This time around a lot of us have been familiar with the course and therefore could find our way through it. It has been an excellent course indeed.

### Question 2

Please list those aspects of the seminar you found most useful.

The hands on.  
The interactions tutor/participants .  
participants/participants.  
The readings.

- Group and class discussions were interesting and enlightening..

- Discussion on the role of ICTs in DE was interesting and educative.

- The delivery process in DE using various technological alternatives.

- Developing a Business Plan.

- Merits and demerits of web-learning.

- Planning for a new course. Developing a business plan.

- Aspects that I found most useful were:

- Session with South African Distance Education Practitioners on a range of DE policy issues.
- Building of the network of support relationships across national boundaries, notably the Southern Africa group.

- Training and support in relation to the online delivery of this course.
- The preparation of a draft business plan (although this was not completed, it is a useful activity).
- The discussions on the development of a business plan, though time was not sufficient to cover most aspects in detail. The demonstration of the Web Management system of Penn State University. The small group discussions on policy aspects for DE.
- The following are a few of what I found useful:
  - We were exposed to a wide experience of at least the four formal presenters and also that of the participants
  - A reasonable understanding of how to develop a policy
  - A practical experience in developing a business plan
  - How to manage an online course
  - Secured a commitment from IITE to support running the courses in Ethiopia.

IITE has a very valuable experience in ICT. Establishing good relationship with IITE for future collaboration is an opportunity by itself.

To acknowledge last but not least the network established with fellow participants and the contact established with the course moderators is very valuable.

- The panel discussion, where various experts were brought in to field questions and share their experiences with the participants. The practical guidance on the development of the business plan to implement the course in the participating countries.

- Demonstration of the ability of ICTs to enrich the delivery of content in DE.

The power of the web to facilitate synchronous delivery. This was demonstrated during the UNESCO seminar held in France.

- Aspect I found most useful included:

- Ms Black's contribution on how to teach online. This confirmed a lot shared earlier.
- Prof Moore's summary; quite authoritative.

- The group discussions and the experiences given from different Countries.

The Online activities which were very helpful and they were they were conducted.

The assignment given and submitted were of great assistance to my daily activities in DE by ICTs.

### Question 3

Please list any suggestions you may have regarding how the 2nd seminar could be improved in the future.

- More face-to-face discussion is needed than long lectures that throws participants to sleepy environments especially in the afternoon sessions.

- The moderators have assessed the mode and the circumstance under which the face-to-face delivery is conducted and adjusted the delivery mode accordingly. This is highly commendable.

- A bit more time for assimilation of contents.

- There is a need to have another face-to-face meeting which will come and evaluate what we were taught and how it was applied in our Home Countries.

Time was very short in such a way that there was a rush on some of the topics so as to meet the limited time.

We also needed more time for interacting and postings of different threads during the second face-to-face session.

- Generally there isn't anything to suggest since I've rated the session excellent. Maybe there must be more time for the activities. This will call for reducing the number of activities in the programme.

- Put in more time, especially to cover some of the most important aspects of the seminar especially the business plan.

- Suggestions that I can make are:

- That in the 2nd. session there should be a review of the online activities that took place between the 1st and 2nd seminar, so that all participants are brought up to the same level before 2nd. seminar material is given - otherwise those who are left behind never catch up.
- Attempts should be made to ensure that all planned activities are done, even when there have been some disruptions. We had some (welcome) disruptions, but we still had to fulfil the items on our schedule.

- Include on the agenda all matters that will be discussed, otherwise issues that come impromptly will reduce the time spent on important course related issues.

Ensure that all important matters that appear on the agenda are addressed.

Try sticking to the agenda as far as possible.

Give more time on key aspects such as the business plan.

## Participants' Overall Ratings of the Course

*Note: In accordance with accepted practice of qualitative research, students' comments provided have not been edited. In addition it must be emphasised that the majority of participants were communicating through the medium of a second or third language.*

### Question 1

This question covers the entire course (Both face-to-face sessions and the online activities).

Please provide feedback on the extent to which the course aims have been achieved. The stated course aims are listed below:

The course aims to inform you about each of the following:

1. The concept of DE, its history and the role of ICTs in this form of education;
2. Achieving the core functions of teaching & learning in DE and corresponding organizational, social and technological implications;
3. The overall DE system including program and course design procedures using ICTs;
4. Teaching principles with special attention to ICTs;
5. What is known about learning and the special needs of learners and corresponding implications for ICTs in DE;
6. Principle policy issues at institutional and national levels.

In addition to these general aims, this pilot course also aimed to:

1. Teach participants how to use the distance education platform for their online activities;
2. Assist participants with the planning associated with presenting the course in their own countries;
3. Provide guidelines for web delivery of DE.

- The objectives were attained in record time bearing in mind the amount of material covered in such a short space of time.

I Have gained a lot from this online experience.

- I would say all the aims of this course were achieved. But I also would like to mention that the 5th aim which is on special needs was not given enough discussion time.

- I want to mention that the facilitator, Wayne has worked very hard and deserves credit for the success of this course.

- I would rate attainment of course objectives as 2 (Good).

- I feel to have achieved a lot as outlined in the 6 listed course objectives.

- The Course design was ambitious. With hindsight, it would look unthinkable to deliver so much in such a short time to people on full-time duty and also get three written assignment. The assignment questions were open-ended and encourage people to pick-up research topics in that direction.

- I would like to congratulate the course moderators for ensuring high level of objective attainment.

- It is apparent that time was short for most of the practical activities though. But all in all the course has met all of its objectives.

- The course objectives were all attained, sometimes not as in depth as one would have liked it to be. Thank you for a variety of experiences gained in this course.

- The objectives have been well achieved, and I feel very comfortable with how they were delivered and absorbed.

- The course objectives I am sure have been achieved. The only one which needs to be improved upon is the ability to create the site and put in the threads, the discussion forum, assignments etc.

- I think the course objectives were met specifically as relates to: the concept of DE and the whole DE system; ICTs and how they can be applied; the teaching principles associated with DE; organizational and management issues and related logistics: the application of DE; to learners with special needs; and the whole question of policy related to DE the facilitators used both the face to face and the online activities in meeting the course objectives. I plan to use the information gained to streamline some areas in the way DE is being handled in my institution.

- The specific course objectives were achieved. Of the three additional general aims the following were partially achieved:

1. Teach participants how to use the De platform. We can use the DE platform at the participant end, but we need to learn to use it from the trainer end.

2. Provide guidelines for web-based delivery - It would have been nice to include some practical component to make this aim more realistic to participants.

- Overall, the course achieved its main objectives. The theoretical and practical issues on DE were excellently explained, with focused practical assignments to reinforce this; the role of ICTs in DE has been revealed and emphasized; the need and feasibility of opening up DE to the marginalised and challenged groups using ICTs has also been examined; policy issues have been examined at both institutional and national levels; and, even most importantly, participants have been taken through a practical step-by-step session on how to structure the various proposals to enable them implement this course over to their respective countries.

- The concept of DE, its history and the role of ICTs in this form of education were well articulated both in the course modules and the assignments which we did. I now have a better understanding on the concepts of distance and open learning.

The core functions of teaching & learning in DE and corresponding organisational, social and technological implications were adequately covered.

The overall DE system including program and course design procedures using ICTs were covered during the course. However, I believe more time needs to be allocated for this if this course will be offered again in the future.

Teaching principles with special attention to ICTs was adequately addressed and sufficient examples were given.

The special needs of learners and corresponding implications for ICTs in DE were covered well, adequate literature material was also provided. We also had the opportunity to visit a facility at UNISA which handles needs of learners with special needs.

Policy issues at institutional and national levels was covered well.

The use of distance education platform for online activities was covered well. I can now confidently surf the UNESCO-IITE platform.

We prepared a draft business plan to launch a similar course in our own country. I would like to thank the facilitators most profusely for assisting us do this.

I strongly believe that more time should have been availed and a practical example given to demonstrate web delivery of DE.

- The course objectives were fairly well covered. The presentation of theoretical content was well done both in the face-to-face mode, on CD-ROM (Readings) and online. However, there was no adequate time to digest and discuss conclusively what was being discussed. The group interaction online was also limited due to time constraints. If time had permitted, a lot more should have been done practically on 'DE and the Disabled', 'Policy Issues in DE', and on plans for rolling out the programme in our countries. If more time is availed, this is an excellent course design.



## Question 2

Please provide an overall rating of the entire course using the following scale:

- 1 = Excellent (12)
- 2 = Good (5)
- 3 = Satisfactory (0)
- 4 = Poor (0)

- Just too marvellous.

## Question 3. Open commentary (if applicable).

Please write a short paragraph of you thoughts and experience of this course. A special addition of the IITE newsletter will be dedicated to this project. The editor has requested comments from students for publication.

- This is a useful and relevant course for ODL practioners. I particularly see it as very relevant to material developers (instructional designers), tutors and managers and/or leadership in distance education. In that sense I perceive it as an effective staff development tool. It provides participants with that online distance learner perspectives which so many of us have yet to experience yet we are already working in distance education.

- It has been really great. The moderator were very resourceful and cooperative, UNISA was great in hosting the program. I'd say it was a successful workshop. Contentwise, I'd expected more of the ICTs aspect than DE. Topics on the kinds of ICTs that can be implemented in the different types of education systems and so on, would have made the course more useful. Finally, thanks everyone especially Wayne and Bob.

- The course was extremely informative I am truly delighted to have made the decision to come to Pretoria. What I learned in this course will definitely help me and my institution improve the quality of delivery of distance education. The impact the course will have in the delivery of distance education in Africa is guaranteed.

-The course "Information and Communication Technologies in Distance Education" organized by UNESCO-IITE and UNISA has given me a wonderful opportunity to support my experience in distance education with theoretical basic. In particular I have gained:

- a good knowledge of how to implement ICT for education
- experience on deciding the appropriate delivery mode for a given circumstance
- the understanding of the fundamental issues to influence distance education policy in my country
- the necessary tools to prepare suitable teaching material for delivery via distance

Sufficient knowledge and skill to serve as a future facilitators of the course.

- This is the most useful course I have undertaken in recent times. It was very informative, well thoughtout, well presented and professionally articulated. The facilitators were very knowledgeable and committed to their work. Having organized the Nairobi workshop where the recommendation for the course was made, it is a personal satisfaction to me that the recommendation was implemented and that I became one of the beneficiaries. The course has given me the necessary skills to mount a similar course to my colleagues in my Institute. The course has also opened up new opportunities for me to undertake online courses with ease. I wish to thank IITE-UNESCO and the facilitators for the wonderful idea/work.

- This was a well planned and organized course, which was run by facilitators who have a passion for ICTs in Distance Education. A lot of work has gone into the planning and running of the course and we are grateful to the facilitators. Such a course should continue to be offered to other DE practitioners so that DE can continue to develop and afford our brothers and sisters an opportunity to access tertiary education. Without providing Education For All (EFA), our countries will not develop.

I would, however, suggest that when it is offered next time, the full details on the course should be given to the participants and the organizations that they come from, so that they are appraised about the time requirements for the course.

- At entry going to this course I had no skills on online learning and also had scanty understanding on Distance Education. However, I thank to the course designers, moderators and the UNESCO-IITE that at my exist point I have the skills on online teaching and learning and more understanding on DE -concept and process of delivery. I will be able to teach others in Tanzania particularly on online learning and a wider understanding on DE.

- The course was very heavy, both in content and activities. The two face-to-face sessions were quite demanding not only on the students (who had to attend the forums, post threads on the discussions, submit assignments and also do the readings for the course), but also on the tutors (who had to deliver the content, set exercises and assignments, give evaluations, and guide the learners on the whole course). This programme has laid a firm foundation in trying to achieve the overall objective of the course: "building capacity in ICTs for DE in countries in Africa," as most of the participants are very confident in their ability to take the process to their various countries.

- Personally, I enjoyed the training, I learnt a lot, and is confident that, in spite of the many challenges ahead, the project is implementable.

- Though quite demanding for a fulltime employee, this course is a necessary tool for any ODL practitioner. It gives a holistic picture of what a successful ODL programmes could and should entail. To start with, there is a lot of theory on ODL, which will benefit the new comers into the world of ODL. Then there is a comprehensive hands-on experience on how to work online. While it gives the participants the theory of using ICTs in ODL, it also provides a practical experience on how one of the many ICTs can enhance learning.

- This course has helped me realise that with critical and proper planning, it is possible for Africa to go into technology-enhanced DE.

- The IITE course has been an eye opener and a journey into the practical realities of distance education in general and use of ICTs in distance education in particular. It was not easy, in fact it was very demanding and required personal commitment and self-discipline to some extent. However, formal course content blended with the practical realities of the various countries and the input of the facilitators rendered this course commendable. The course is based on use of ICTs in distance education and I believe it achieved its overall aim. We learned by actually using various technologies and the experiences of the various countries and facilitators will enable us to avoid many of the pitfalls associated with use of ICTs in our future development of distance education courses and our choice of appropriate technologies. The on-line component was particularly interesting and a range of skills were acquired in the process. It has been an enriching experience.

- Going through this course has been one of the best things that ever happened to me.

My ideas of the systems, operations, mechanisms, concepts, and generations of DE have been very much nourished.

In addition, I have been exposed to the fundamental principles behind the integration of both older and emerging ICTs into DE.

- I can confidently say that I have acquired new skills, and I am now in a much better and refined position to carry out DE operations in Ghana - irrespective of whether my services are needed locally or nationally. I have also come across other DE colleagues and experts, who I can either collaborate with or fall upon for advice, should any need arise in our quest to propagate the gospel of ICT-enhanced ODFL world-wide.

I can hardly thanks IITE enough for this unique and wonderful and life-long-learning experience.

- The course have been of great importance to me.

I have been able to understand well to use the distance education platform for the online activities. Well informed on the concept of Distance education, its history and the role of ICTs in the form of education. Also the achieved the core functions of teaching and learning in Distance education corresponding, organizational, social and technological implications.

The overall DE system including program and course design procedures using ICTs have been well achieved.

- The course has exposed me so much to the organization of DE programmes. This include the various definitions of DE, the various delivery modes, the application of ICT in the DE organization and delivery and the advantages that my country will derive as a result of making use of DE as compared to the convectional face to face delivery. The problems associated with DE and how to overcome them have been addressed in this workshop. The on-line approach has exposed me to a lot of experiences in how to work on line. On the whole it is a very important course that will help me build capacity in DE courses in my country.

- I came onto the course with a lot of skepticism over whether it was appropriate to even start discussing ICTs in DE on a continent like Africa. The course gave me an opportunity to think again. By the end of the course, I am convinced that if Africa has to forge ahead in development, ICTs are a key, and more so for DE.

The course has afforded me opportunity to reflect on the experiences of other players in the global field of DE and to build networks which I believe will prove invaluable in my future contributions, in whatever way, to bridging the learning divide using ICTs. The experience was worthwhile. But like Oliver Twist, I ask for more. If something can be done to enable more of us gain this basic knowledge and even go on to develop actual teaching/learning material on this platform, let it be done.

- Online delivery of DE was unknown to me before. I can now appreciate what it is and understand the implications. This will assist the MCA to proceed with its online projects.

The facilitators were very accommodating and willing to share their experience and knowledge with us. We all benefited.

Well done.

- A cutting edge, contemporary, thought provoking and yet very informative course on ICTs and Distance Education. The most significant parts for me that i gained tremendously were the theoretical foundation issues of Distance Education and the variety of ICTs that are relevant in the delivery of DE. Further, through this course, i have established networks that otherwise, would not have been possible, with practitioners and researchers alike in Sub Sahara Africa and the world over, who are passionate about making access to education a reality to all people on this planet. It has been such a wonderful experience for me.

- Honestly, this IITE course has enhanced both my knowledge in Distance Education and computer skills pertaining to on-line courses, and the potential of digital ICTs in DE. It has also provided me with sufficient technical know how for designing a "Business Plan". Furthermore, it has enabled the establishment of a true collegial and supportive group' whom I feel at ease to seek for assistance or advice in any areas of their expertise. It has uncouthly, created the means for us to support one another from the African continent. It now up to us to keep this network active.

Thank you to all.

- It was a very interesting course indeed. I enjoyed the face-to-face and group discussion Forums interaction mostly. I think I have gained more knowledge about the types of ICTs in relation to the different contexts. I however, expected to receive more hands-on with regard to the actual setting up of an ONLINE Course, Online.

- This course has proved to me that DE is the education for the future. It keeps up with the global trends in education, and using ICTs in DE, is the answer to "Education for all" to alleviate poverty in the world.

I am privileged to be part of such a dynamic course and group. The course was well structured and presented, one of the best that I have ever done, and I have done many courses in my life.