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**Ensuring Quality of Distance Education for Higher Education:
The Case of the African Virtual University (AVU)**

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**Working Document
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Acronyms and abbreviations

| | |
|--------------|--|
| AC | Advisory Committee |
| AVU | African Virtual University |
| IEEE | Institute of Electronic Electrical Engineers |
| MIT | Massachusetts Institute of Technology |
| NEPAD | New Partnership for Africa's Development |
| PCC | Program Coordinating Committee |
| RMIT | Royal Melbourne Institute of Technology |

1. EXECUTIVE SUMMARY

1.1. Introduction

1. Although Governments in Sub-Saharan Africa have made very considerable strides in developing higher education, financial pressures impede further significant financial support. Tertiary institutions in their present form are overwhelmed with problems related to finance, quality, internal and external efficiency.

2. It is in the context of the above situation of higher education in Africa that the World Bank initiated the African Virtual University (AVU) in 1997 to supplement efforts in revitalizing higher education in Sub-Saharan Africa. Essentially, AVU is a technology based distance education which leverages the power of Information Communication Technology to increase access to quality education resources.

3. The implementation of AVU was planned in three phases, Pilot phase, Transition phase and Operational phase. The Pilot phase, 1997-2001, witnessed some 23,000 students taking short courses in Information Technology and 3,500 people participating in executive seminars. The end of the pilot phase marked transition from a World Bank project status to that of fully-fledged virtual University registered in Kenya as an Inter-governmental Organization.

4. The operational phase started in 2002 and is scheduled to last till 2007. AVU has expanded its learning centers to 34 across Africa. It has introduced a four-year degree and a two-year diploma in Computer Science for Anglophone students. Degree and diploma in both Computer Science and Business studies for the Francophone will commence in 2004; further programs in teacher training and public health are also under consideration.

1.2. Some reflections on the AVU's pedagogical approach

5. The AVU educational model is learner centered with some key effects on the roles of both the lecturer and students. It is now clear that many of the activities, which used to be the domain of the faculty's academic staff responsibility, are now shared with their students. Such faculty members have shifted from being experts in knowledge transmitted to students through expositions, their traditional dominant role for many years and the quickest and easiest way of delivering knowledge and skills to students. University lecturers participating in the AVU have now taken on the role of the learning-facilitator and student's guide. Students now play a key role, while the lecturer is expected constantly to monitor what is happening during the process, in order to guide students properly. As facilitators, they provide learning opportunities for students using adequate teaching support methodologies and techniques.

1.2.1. Mode of delivery

6. AVU has adopted a mixed mode of delivery for all its programs in order to maximize stimulus, variation and enhance opportunities for teaching and learning. For instance, the AVU computer Science program is being delivered to students in a mixed mode format. This approach aims to maximize the use of technology availability. Students find themselves using Internet extensively, but also having access to a local facilitator for explanation, feedback, assistance and assessment, engaging in online

quizzes and tests, but also having print based materials for easy reference and flexible study. Different modes of operation have been devised for programs.

1.2.2. Internet

7. The prime delivery mode and repository of all course materials is through a learning management system called WebCT. All AVU courses have been designed for this product which is installed at the hub in South Africa. Students in each AVU center have high speed access to the materials in WebCT via the internet.

1.2.3. Intranet

8. Additionally, all WebCT course materials are loaded onto a local server CD-ROM. Students PC's are linked to the local server via a network (LAN). This mode of delivery is commonly used when students cannot access the course materials via the internet.

1.2.4. CD-Rom

9. Each AVU center receives backup copies of all course materials on CD. These can be used by students when other technology resources are not available. These materials are standalone versions of the course materials; - they do not use WebCT.

1.2.5. Email

10. Email is another form of communication that is very important to today's student. It is expected that all topics of general interest to the student in a course are addressed via the discussion group – and that emails between student and facilitators are restricted to matters of process and protocol of an individual nature.

1.2.6. Satellite TV broadcast and Video

11. For some courses, the on-line course materials is supplemented by live lecturers, broadcast from Melbourne Australia at specific times because of the differences between Africa and Australia, these lectures are scheduled for mornings in Africa. Specific details of the dates and times of lectures are provided to students at the start of the semester. Broadcast lectures may be videoed in Africa for repeat use.

1.2.7. Digital library

12. In addition to academic resources, students access the AVU digital library and the RMIT digital library. Both libraries provide electronic books in Computer Science and e-journals. The AVU digital library enhances the teaching and learning for AVU's degree and diploma programs.

1.3. Challenges

13. Although AVU has experienced tremendous success in providing quality education in Africa, there are a number of challenges that continue to impede the implementation of its programs. These include: -

- Scarcity of computing resources

- Slow internet connectivity
- Unfavorable communication policy
- High telecommunication costs
- Lack of capacity in Information Communication Technology (ICT) skills
- Attitude towards Technology enhanced learning

1.4. Prospects

14. Current enrolment rates in Sub-Saharan is among the lowest in the world. However the AVU model will therefore assist in tapping potential offered by new technologies to overcome some financial, physical and information barriers in the following ways

- Provide opportunities for higher education studies at University level
- Open up opportunities for women in science and engineering
- Build capacity in computer literacy skills through extensive short courses
- Enhancement of job placement for its graduates

1.5. Conclusion

15. Though AVU faces some challenges, the use of electronic media could have an enormous impact on the delivery of accredited degree programs and training in Sub-Saharan Africa.

2. INTRODUCTION AND BACKGROUND

16. Although the main focus of educational provision in developing countries remains basic education, this does not and cannot preclude the need to develop higher education. Governments in Sub-Saharan Africa have made very considerable strides in developing higher education – but financial pressures impede further significant financial support. At the same time the limitation of traditional face-to-face higher education in Africa, is becoming clearer. Tertiary institutions in their present form are overwhelmed with problems related to access, finance, quality, and internal and external efficiency. Limited space and declining budgetary levels prevent universities from servicing the growing demands of higher education. Staff are often overworked and underpaid and lack the incentives to update curriculum, investigate new teaching technologies, and participate in knowledge-sharing and knowledge creation (AusAID 2001:3). Existing universities cannot meet existing levels of demand (AusAID 2001:4): there are too few trained faculty; research is limited; educational materials and facilities are of poor quality (e.g. African libraries have suffered immensely as collections and laboratories become antiquated); and academic programs do not meet modern requirements. Such universities are incapable of bridging the ‘knowledge gap’. Furthermore, most of these problems also afflict ‘conventional’ correspondence-based distance education programs.

17. If Sub-Saharan Africa is to participate actively in the global economy and solve its many social, technology, and political problems, it has to invest in education in order to build its capabilities in the fields of science, technology and business. Unfortunately ‘current university programs in Sub-Saharan Africa, particularly in science and technology, are insufficient to respond to the demands of a changing labour market, satisfy the students’ thirst for higher learning and spur development. Meanwhile the science and technological gap between Sub-Saharan Africa and the rest of the world is widening at a disturbing rate’ (Diagne 2000:21). This ‘knowledge gap’ inhibits Sub-Saharan Africa’s ability to develop a critical mass of trained professionals. It is therefore imperative for the future economic and social development of the region that swift and deliberate steps be taken to bridge the gap.

18. It is in the context of the aforementioned situation of higher education in Africa that the African Virtual University (AVU) was incubated and initiated by the World Bank in 1997 to supplement efforts in revitalizing higher education in Sub-Saharan Africa. Essentially, AVU is a technology based distance education which leverages the power of information communication technology to provide access to quality educational resources.

19. The AVU distinguishes itself from existing distance learning operations in the continent through the partnership with existing institutions of higher learning, the multi-national scope of its program development effort, the innovative combination of technologies and instructional methodologies, the extent of learner support and training of learning support teams, the broad access to educational resources by students, and its contacts with public and private sectors.

20. The implementation of AVU was planned in three phases; pilot, second and third phases. The pilot phase, (1997-1999), essentially established that the model was viable: that is, that a system involving partnerships and using advanced telecommunications systems could work, politically, logistically and financially. Evaluation of the pilot phase indicated *inter alia* that:

- Technology offers one of the most practical solutions to increasing access to quality education and information in Sub-Saharan Africa.
- The pilot phase had created high expectations among students, parents, employers, public and private sector organizations, and governments.
- People were willing to pay for AVU programs.
- Partner institutions were prepared to commit their own funds, as well as funds from their governments to support the AVU.
- AVU's educational products had to be sensitive to the social-cultural reality of Africa.

21. Although the pilot phase was very successful, with some 23,000 students taking full semester courses in science, and some 3500 people participating in the seminars, at the end of the pilot phase a number of challenges faced AVU. These arose from the economic and financial context, with the result that AVU was struggling to deliver its promise of providing access to high quality tertiary education on time to as many qualified African students as possible. Some of the major challenges that arose included:

- The problem of securing international accreditation for AVU's curriculum, teaching and learning methods, and delivery modes: This was likely to be a cumbersome five to ten year process. African universities were unwilling to enroll students without a clear pathway for the accreditation of the student award. As a result AVU was unable to clearly define launch dates for its degree programs.
- The perception held by African universities including AVU's partners that AVU was a competitor rather than a positive intervention that would help them address issues such as increasing access, gender equity, and inadequate capacity in higher education. AVU's partners generally did not demonstrate the required levels of commitment to AVU's goals given their concern that AVU would metamorphose into an independent university within their campuses, and without a clear legal framework defining the relationship.
- The cost of delivering degree programs via satellite broadcast technologies was prohibitive. For example it cost approximately US\$ 12,000 to deliver the required 12 hours of instruction per week per course.

22. The African Virtual University (AVU) commissioned a strategic review in 2001. The Strategic Review Recommendations were largely accepted by the AVU Board of Directors, management and funding partners because it proposed a plan that enables AVU to offer accredited degree/diploma programs that would immediately increase access to higher education in Africa. In essence, AVU decided in the short term to refocus itself from the role of direct end-end service provider of accredited educational programs, to being the **architect, facilitator and integrator** of an education network that matches student needs to university supply. African institutions are to be linked to their counterparts on the continent, and elsewhere, while allowing the primary market players (i.e. the partner institutions) to maintain their own roles and incentives. AVU will continue to assist Sub-Saharan African universities by identifying educational program needs, sourcing appropriate content, implementing the necessary technical infrastructure, aggregating demand to improve purchasing terms, and facilitating (not replacing or owning) the contracting and fulfillment process. AVU will deliver the following products:

- Accredited degree, diploma and certificate programs in areas critical to sustainable development but ones not adequately catered for in existing institutions;
- An enhanced digital library with more journal titles and e-books to support the educational programs to be offered;
- An educational Portal to serve as an outreach to the broader educational community; and
- Technical support services to African universities to enhance their capacity to access educational resources and to share knowledge generated at their universities globally.

23. The end of the second phase (1999-2001) also marked the transition of AVU from a World Bank project status to that of an independent African institution based in Africa and managed by Africans. AVU became a fully-fledged, virtual university headquartered in Nairobi, Kenya, as an inter-governmental organization. AVU staff from Washington, D.C. relocated to Nairobi, and a substantive Chief Executive Officer was appointed. It was also agreed that there should be an increased level of participation of African academics and professionals in content development and delivery; that the academic programs should be expanded to include, at least initially, full undergraduate degree programs in computer science, computer engineering and electrical engineering; and that the capacity of partnership institutions to participate more effectively in the network should be increased by, for example, improving Internet connectivity, laboratory facilities, and the digital library.

24. The third phase of the project beginning 2002 is scheduled to last to 2007. The third phase has already seen AVU expand the number of its learning centers to 34 across Africa. It has introduced four-year degree and two-year diploma in computer science, for Anglophone students. Computer science degree and diploma for participants Francophone will commence in January 2004. Degree and diploma programs in Business Studies will start in February 2004, and further programs in Teacher Training and Public Health are under consideration.

25. AVU has two distinct programs; short courses (continuing education) and degree and diploma programs. As earlier mentioned, AVU's programs contribute to improving the quality of teaching and learning in higher education in Africa by leveraging modern technologies. The sections below focuses on two programs; the short courses program and one degree/diploma program which is currently in progress.

3. THE QUALITY OF TEACHING AND LEARNING IN THE SHORT COURSES PROGRAM

26. AVU's main continuing education training programs have from the start of the project comprised short courses delivered in different ways using appropriate technologies, although there are two basic models – one using satellite-delivered video lectures, broadcast to classrooms in the local learning centers where the students view the materials on television, projector or computer, and the other using a variety of materials (including electronic materials) that students can study either at the learning centers or elsewhere.

27. The aim of AVU's short courses program is to impart skills, knowledge and attitudes that are essential in business and in the knowledge economy, to upgrade workforce skills, and to enable the workforce in Africa to take advantage of changing technology. The underlying principles are to provide a vehicle that enables high quality skills transfer from the 'best' professors to African students and maximizes access to the programs on the part of African learners. To operationalise these principles, AVU procures content for short courses programs from anywhere in the world. In essence, the best 'professor' teaches the whole continent by leveraging the power of information technology. AVU does not develop its own courses, but instead procures courses for use by its partnership institutions. Licensing arrangements vary: in the case of some short courses (for example, the computer courses that AVU procures from the Massachusetts Institute of Technology (MIT)), AVU purchases a 'single use' right to broadcast the courses just once to a specified number of learning centers. In other cases AVU buys a 'multiple use' right to transmit materials as many times as it likes, to as many centers and students as it likes. Finally AVU has a different licensing agreement for whole degree courses under which it pays a fee to buy the license for the degree course. Thus, for example, it has recently entered into an agreement with the Royal Melbourne Institute of Technology (RMIT) in Australia to buy the license for a degree course in Computer Science. The license period started in January 2003 and during the four-year license period RMIT will transmit the course contents for use by AVU partner institutions. At the end of the four-year period, the license will revert to AVU.

28. For the short course program AVU targets out-of-school students, conventional university students, graduate students, faculty and university top-management, teachers, civil servants and government cadres, armed forces personnel, businessmen and women, journalists, and those working in the private and public sectors. Its target groups not only differ in age and employment status, but also require a wide range of different courses, tailored to their particular needs.

29. To respond to different needs, AVU provides a range of modularized courses of varying lengths (from two weeks to one year) that are packaged to suit different clienteles. Once a needs assessment has been done and relevant courses identified, AVU procures course content from the best institutions in the world, subject to the need to accommodate the varying linguistic requirements of its market. Subjects covered include courses designed to help students develop their careers and obtain employment (e.g. courses enabling students to understand their aptitudes better).

30. AVU uses a technical infrastructure that integrates satellite and web-based technologies to transmit video and data resources from anywhere in the world to multiple sites in Africa. It also provides the flexibility to incorporate proven and emerging interactive tools and multimedia resources to support student learning and network operations. A combination of live and videotaped instruction supported by textbooks and

course notes, is provided by leading universities and content providers. Quality Assurance indicators are set by the content provider and AVU. Students interact with their instructors and other students via phone, email, and discussion forums or chat and fax. AVU transmits courses and seminars via an international satellite whose footprint covers the entire African continent.

31. As well as offering access to an almost limitless amount of information resources the Internet and modern information communication technologies have influenced learning pedagogy (see, for example, Peter, 200, 2002). E-mail is widely used in the AVU to facilitate basic communication, but also for students to mail their homework and for teachers to provide feedback and monitor individual students progress.

32. AVU operates through learning centers located in conventional universities. The centers act as semi-autonomous units managed by staff appointed by the local Vice-Chancellor, and paid by the University. Centers are expected to function as business entities. The main aim of these entities is to provide quality education in information technology and management courses. Students who attend the learning centers are able to make use of a range of facilities – watching broadcasts, accessing information through the digital library services, taking part in video-conferences and discussions, and seeking guidance and support from facilitators.

33. The local facilitators, who are based at the learning centers, play a key role in supporting the learners – and this is the case irrespective of whether they are taking broadcast video courses or offline courses. Most of the facilitators are on part-time contracts, and there is a widespread use of professional practitioners to facilitate the management seminar courses. AVU's learning-centered educational model has some key implications for the roles of both the lecturer and students. The staff are no longer seen as experts whose job is to fill the students with knowledge; rather they are guides and facilitators of the learning process. Students are expected to play a key and active role in the management of their own learning (although the lecturer is expected constantly to monitor what is happening during the process so that he/she can guide individual students properly).

4. THE QUALITY OF TEACHING AND LEARNING

34. The Quality Assurance of AVU's academic programs is based on specific indicators:

- Need for the program
- Educational design including appropriate graduate capabilities, well designed programs with clear learning objectives and outcomes.
- Equity in selection, transition and teaching support for students.
- Appropriate delivery system.
- Management of programs with respect to processes of student communication, input and feedback to ensure the program remains relevant for all stakeholders.

35. The quality of teaching and learning in AVU degree and diploma programs is based on the effectiveness of procedures and processes that enable students to achieve qualifications. Academic standards are pre-determined and must be reached to achieve a qualification. The section below gives an overview of quality indicators, processes and procedures involved in improving the quality of teaching and learning.

4.1. Need for AVU accredited programs

36. The need for AVU programs arises from the demands of the knowledge economy which is sweeping around the world influencing how people communicate, perform business (e-commerce) and learn (distance education). Increasingly, employers are demanding not just graduates with qualifications, but graduates with experience, capability and real world understanding to add value to their employing organization. AVU programs are therefore designed to combine and integrate learning experiences at professional work place through applications (for example, case studies, business simulations and industry projects).

4.2. Program design

37. One of the key objectives of AVU is to provide quality and affordable education programs to many students in Africa and to produce international graduates who can fit anywhere in the world. For this reason, programs must be relevant to the African context and meet international standards. AVU intends to roll out two accredited degree programs starting 2004; (Computer Science degree and diploma (Francophone) and Business Studies (Anglophone)).

38. The on-going degree and diploma in 4 Anglophone universities started on 3rd of February 2003. The curriculum for AVU programs is designed and developed by the selected content provider. In the case of the computer science degree and diploma program, the RMIT was competitively selected to design the curriculum and deliver and accredit courses to AVU network for a period of 4 years. The RMIT computer science curriculum is accredited by the Australian Computer Society and approved by the Institute of Electronic Electrical Engineers (IEEE). AVU academic programs have a strong components of capacity building and skills transfer to one lead African partner University. The program design incorporates components of contextualisation to make curriculum relevant to African environment.

4.3. Selection procedures and processes

39. Equity, transparency and accountability underpin the selection of key stakeholders in AVU degrees and diploma programs. In the AVU's new model of operations, the external content provider builds capacity within the lead partner university to be able to take over after the contract period. This model ensures skills and knowledge transfer to an African university to deliver, guide, supervise, and accredit AVU degree and diploma programs through out the continent.

40. Although AVU has a network of 34 learning centers, not all of them have the capability to deliver degree and diploma programs. Learning centers that will participate in any program are selected competitively and the selection is based on set criteria which require sites to have high internet connectivity (at least 256 Kbs); experience in providing and managing the AVU short courses program, administrative structure and identified core personnel; ability to generate income etc.

41. For the current computer science degree and diploma program, Dar es Salaam university was selected as a lead partner university and 13 learning centers expressed interest in participating in the program. However, four universities started the program during the first year; University of Dar es Salaam (Tanzania), University of Cape Coast (Ghana), University of Kigali Institute of Technology (KIST) (Rwanda) and University of Addis Ababa (Ethiopia). Every year, a new cohort of students will be admitted. The process of selecting the best content provider, lead partner university and participating universities ensures high standards in the choice of curriculum and institutions to deliver the product to students.

42. Additionally, quality standards are set in the most critical aspects of education involving selection of qualified candidates. This is the most challenging process given that education systems in Africa are different. In Francophone Africa, the system of education is different from the Anglophone system. For example, some countries in Africa require advanced higher education level 'A' level, while others only require 'O' level before university. There are also institutions which follow American and British Systems of education. There is a whole mix of educational systems before university level which makes it very difficult to select students with good academic standards eligible for university education across the continent. The challenge is compounded further by lack of good systems for recognition of prior learning. All these variables pose great challenges to AVU in facilitating higher education in Africa.

43. This challenge has been met by adopting a system of student selection that fits each African country on the continent: – For example, RMIT developed a system which outlines minimum academic requirements for selecting qualified candidates for university entry in each African country. The admission office in Melbourne – Australia follows the National Office for Overseas Students Recognition (NOOSR).

44. According to this NOOSR scale, for example, the minimum qualifications for admission into a computer science degree is as follows: – pass in mathematics with minimum grade as follows:

- Ethiopian School Leaving Certificate Examination – GPA 3.0.
- Ghana Senior Secondary Certificate Examination – Grade 3.
- Tanzania Advanced Certificate of Secondary Education Examination – Grade C.
- Kenya Certificate of Secondary Education Examination – Grade B

45. In each case students are expected to have achieved any of the English language requirements:

- IELTS – 6.5+
- TOEFL – 580+

46. Proficiency in English is mandatory since English is the medium of instruction. The entry requirements are the same as those for RMIT students in Australia. A student enrolled in Africa and undertaking the course through AVU modes of delivery is exposed to exactly the same academic requirements as a student doing the same degree course in Australia. For example, the curriculum, entry requirements, Quality Assurance indicators, assessment etc. are all the same. A good and solid process of selecting students is a prerequisite to quality education because it ensures capable students who are able to learn and acquire skills and knowledge and have the ability of developing critical thinking abilities and creativity.

47. The processes involved in screening students' applications are rigorous and lengthy. Applications are first and foremost selected at the participating level, and sent to AVU headquarters for further screening. The last stage is screening of applications by RMIT who perform the final selection, admit students and issue admission letters to all students. However, there are challenges in this process because good high school graduates are selected by National good public universities and are eligible for scholarships. It becomes an uphill task in some countries to get good students willing to pay US dollars 1000 per year. Moreover, in some African countries, higher education is free and parents do not see why they should pay for AVU programs. Inability to pay tuition fee is a major risk to programs of this nature. For example, the premier product of AVU attracted 425 applicants from four universities in Africa, out of this number, 395 were admitted. But due to financial problems, only 225 took up the offer. To overcome this risk, AVU is in the process of establishing a scholarship fund to assist poor and capable students in Africa.

4.4. Course delivery and learner support system (educational inputs)

48. The degree program of AVU/RMIT is 8 semesters and students obtain 12 credit points- courses each semester with 3 courses per semester and students spend at least 12 hours per week on each course. Students who successfully complete 288 credit points, including all core subjects are eligible to graduate with an RMIT degree award. The diploma program is four semesters with four courses per semester. Students spend approximately 36 hours per week in total study time. All 16 courses are to be completed in order to graduate with the diploma award. Students who complete the diploma program with good graders can transfer to the degree program and will receive credit of 144 credit points.

49. Availability and efficient distribution of materials is a prerequisite to quality teaching and learning. In the AVU/RMIT program, course materials constitute a critical component of the program. Prior to the start of each semester, all relevant course materials are transferred from Melbourne to the AVU central server. RMIT works with AVU staff to ensure that materials (text books, CD-Roms, video tapes, learner guides – print, manuals) are sent to the LC in good time. At each Partner Institution, the facilitators disseminate these materials to students as specified by RMIT. Additionally a CD version of each course is provided for each Partner Institution, or for each computer as specified by the RMIT Course Coordinator.

4.5. Some reflections on the AVU pedagogical approach

50. The AVU educational model is learner centered with some key effects on the roles of both the lecturer and students. It is now clear that many of the activities, which used to be the domain of the faculty's academic staff responsibility, are now shared with their students. Such staff have shifted from being experts in knowledge transmitted to students through expositions, their traditional dominant role for many years and the quickest and easiest way of delivering knowledge and skills to students. University lecturers participating in the AVU have now taken on the role of the learning – facilitator and student guide. Students now play a key and active role, while the lecturer is expected constantly to monitor what is happening during the process, in order to guide students properly. As facilitators, they provide learning opportunities for students using adequate teaching support methodologies and techniques which include the following:

- Offer the necessary resources such as the WebCT learning platform and create important facilities for quality learning; prepare or define appropriate working environments. Through group work for example, they create a relaxed atmosphere of mutual respect so that students feel at ease and confident when giving their opinions.
- Facilitate effective communication between participants, listen carefully to discover whether and the extent to which the agreed objectives are being met and continue to refocus the process as necessary.
- Assist students in engaging further within their own learning process. Invite students to make decisions, such as selecting information relevant to the course, proposing and making proposals for improvement.

51. In the new AVU setting, during the learning process, the role of the student is radically transformed. Students form part of a community of learners who participate in decision-making through the staff student consultative meetings(held two times in a semester) and they give their views on the course strategy, and establish work commitments to achieve the expected learning outcomes. The student, as an individual, seeks, selects and processes information to obtain results that he/she has to share with the group in discussion forums and chat sessions. In such sessions, students consolidate what they learned, eliminate any errors or prejudices formed and in the process, they extend their vision and contribute to enriching their fellow students' results. This situation makes it possible for students to become aware of the contribution of their colleagues as valuable human resources to be relied on, to improve their knowledge, and thus departing from individualism, promoting social relations and making learning a gratifying experience.

52. Students' work in the AVU model does not end with these activities as they continue with the learning process in which they have to apply what they have learned to reality, in order to understand better and more scientifically. This allows them to analyse ethical and scientific problems presented by society and industries operating in their field of interest. This process is performed by working in virtual groups with diverse strategies, in cooperation with other interest groups and also through students' contributions by developing projects to solve a given need. Furthermore, students themselves identify areas requiring improvement on innovation through a process of investigation or project studies that rigorously apply scientific research methods. In this regard students have total responsibility for the project as they define the objectives, determine the strategies, share responsibility, establish commitments and assess themselves through a process of reflection on what they achieve and how to achieve it.

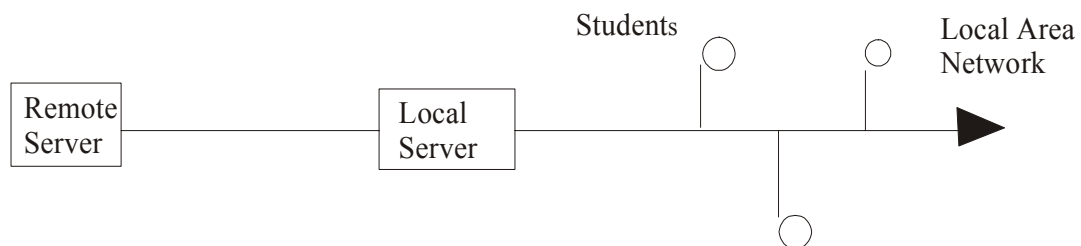
4.6. Mode of delivery

53. AVU has adopted a mixed mode of delivery for all its programs in order to maximize stimulus, variation and enhance opportunities for teaching and learning. For instance, the AVU Computer Science program is being delivered to students in a mixed mode format. This approach aims to maximize the use of technology in course delivery, but is also responsive to the needs of students for interaction, and is aware of the difficulties that may occur from time to time with the technology availability. Students find themselves using the Internet extensively, but also having access to a local Facilitator for explanation, feedback, assistance and assessment, engaging in online quizzes and tests, but also having print based materials for easy reference and flexible study. Different modes of operation have been devised for the program. The Facilitators direct students to the different modes as appropriate. In each Facilitator guide there are suggestions about the time needed for student contact through facilitated classes, tutorials and laboratories. Initially students may require more support than stated. As a general guide, students in the degree program may need 8 hours per week of Facilitator-directed time for each course, while students in the diploma will typically require 6 hours of Facilitator directed time for each course.

4.6.1. Internet

54. The prime delivery mode and repository of all course material is through a learning management system called WebCT. All AVU courses have been designed for this product which is installed at the hub in South Africa. Students in each AVU center have high speed access to the materials in WebCT via the Internet.

55. This channel is ideal for student browsing of materials at any time and place, and for downloading materials for offline study. It also supports uploading student responses to quizzes, tests and assignments, which can be marked with quick turnaround time. It is envisaged that in the future, students may even download their Examination, and upload their answers under supervision within a specified time.



56. If the web is simply used to repeat the delivery of traditional curricula in traditional ways, these efforts may fail much in the same way as the original attempts to use PCs in schools. Current constraints in the Internet (e.g. limited bandwidth for transmitting video or conferencing), costs (e.g. of codifying knowledge), the experimental nature of software delivery systems, and other factors, may limit more active interaction, such as the guided tutoring of students, which reduces its effectiveness for education.

4.6.2. Intranet

57. Additionally, all WebCT course materials are loaded onto a local server CD-ROM. Student PCs are linked to the local server via a network (LAN). This mode of delivery is commonly used when students cannot access the course material via the Internet.

4.6.3. CD Rom

58. Each AVU center receives backup copies of all course materials on CD. These can be used by students when other technology resources are not available. These materials are standalone versions of the course materials, – they do not use WebCT.

4.6.4. Multi-channel delivery

59. Facilitators understand that the preferred delivery mode (channel) is central WebCT via Internet. Local Facilitators should utilize the central WebCT via Internet unless unavailable, or performance is unacceptable. In particular, assignment submissions (if not via WebLearn in Melbourne) and discussion forums should be maintained on the central WebCT. If/when the central server connection fails or performance is unacceptable, then Facilitators switch to the local WebCT via intranet mode. Other modes (e.g. CD, video, paper) are part supplementary (eg. Added value audio/video) and part backup (e.g. Printed notes). The backup CD is used when no access is possible to WebCT either locally or centrally.

60. The reasons for the cascading multi-channel delivery model are:

- Maximize the (central) student cohort learning experience (by increasing exposure to other students),
- Minimize the staff interaction overhead (by reducing need for duplicated local interaction)
- Maximize consistent, standardized quality of delivery (by reducing localized dependencies, interpretations)
- Maximize flexibility and minimize interruption during technical failures (by providing cascading fall-backs)

4.6.5. Email

61. Email is another form of communication that is very important to today's student. It is expected that all topics of general interest to the students in a course are addressed via the discussion group – and that emails between student and Facilitator are restricted to matters of process and protocol of an individual nature.

4.6.6. Quizzes and tests

62. In many courses, the course materials include interactive quizzes and tests that enable the student to determine their progress through the subject. Access to the quizzes and on-line tests is via the Internet to Melbourne. Specific instructions to access this tool, called Weblearn, are provided in the course materials and Facilitators support students in gaining access to Weblearn.

4.6.7. Satellite TV broadcast and video

63. For some courses, the on-line course material is supplemented by live lectures, broadcast from Melbourne Australia at specific times. Because of the time differences between Africa and Australia, these lectures are scheduled for mornings in Africa. Specific details of dates and times of lectures are provided to students at the start of the semester. Broadcast lectures may be videoed in Africa for repeat use.

4.6.8. Supplementary material

64. Each course has some supplementary material, which is available at each AVU center on a CD. In the main, the supplementary materials consists of Real Presenter audio segments with slides, which provide explanations of components of the course that students may need additional support with.

4.6.9. Learner's guides

65. Each student receives a learner guide for each course in which they are enrolled. This paper material, which has been extracted from the online materials, provides details of course aims and expectations, assignment and tutorial work. This supportive material ensures continuity of course progress at times when the technology is not operational or when the student is away from computing resources.

4.6.10. Selection of facilitators

Facilitators

66. The role of the Facilitators is crucially important for the success of the students and of the program generally, hence Facilitators have been selected carefully. They are skilled practitioners or teachers who have adopted the AVU and RMIT approach to teaching pedagogy which emphasizes student-centred learning and a flexible approach to course delivery. Facilitators have a range of materials that they can use with students some classroom based activities and some computer based activities. A Course Coordinator in Melbourne Australia supports each Facilitator.

67. Prior to the start of the semester, the Program Coordinator must arrange for the selection of sufficient, appropriately qualified staff for the roles of learning Facilitator for each course in each program. The best success is achieved by choosing the best possible Facilitator for each course.

Training of facilitators

68. Training for new Facilitators is arranged through AVU. It is important that Facilitators are provided with every opportunity to undertake this training. Training covers educational, operational and technical aspects of course delivery.

Facilitated face to face sessions

69. A local learning Facilitator who supports and directs students as they work through the materials provided supports the online materials for each course. Students attend timetabled sessions with Facilitators in a number of ways:-

Classes – where the Facilitator goes through or discusses a section of the online materials, – there is usually 1 hour per week of scheduled classes, and it is expected that

the students will have previously worked through the material themselves in preparation for the session. All enrolled students attend the one class.

Tutorials – classroom based activities. Here the Facilitator may get the students to work in small groups through specific exercises that will reinforce the class material. Students are encouraged to discuss their results and any problems that they encounter.

Laboratories – the students work through a series of computer-based exercises in order to practice and extend their knowledge of the concepts being addressed. In a computer science program, extensive laboratory practice is essential.

Course discussion forums

70. Students are encouraged to be active participants in the learning process. One important method of communication between the Facilitators and the students in any particular course is via the web-based course discussion forum. Students are able to post questions and comments and generate discussion about any aspect of a course that they are enrolled in. A chosen Facilitator manages the discussion.

4.7. Management of programs and student feedback of learning

71. The management of the program takes place at three levels; RMIT, AVU and at the learning centers. RMIT and AVU are the main players in program management, supervision and advisory services. For example, AVU maintains a program log as evidence of program content and operation. The academic coordinator at AVU analyses reports from learning centers and provides feedback, guidance to learning center personnel and students. Monitoring of the learning process is performed by AVU in collaboration with RMIT. The AVU/RMIT model is very complex and requires constant monitoring and evaluation of the teaching/learning process. To ensure efficient management of the program, specific committees have been put in place to review and improve the program. At the end of every semester, facilitators write reports and forward them to academic coordinators in AVU and RMIT who compile one end of semester report about the success and challenges of the programs for the semester. This input is used to review the program content and program delivery by the Program Coordinating Committee (PCC) and forwarded to the Advisory Committee (AC) in Melbourne.

72. Apart from high level Quality Assurance monitoring committees, there are important meetings at the learning center level which provide feedback and input in the management of the program. The staff-student consultative meeting which is held twice in a semester is a forum where students provide feedback on the progress of the program. Alternative means of soliciting student feedback include student surveys. Students must be surveyed for each course using an approved anonymous survey instrument. These instruments are given to the facilitator and learning center director for analysis. Feedback from the reports is used to improve teaching and learning at the center.

73. Academic audit is performed by RMIT/AVU/lead Partner University twice in a year. This exercise is synonymous to financial audit though it does not involve money. All academic processes, records, assessment procedures and records, and performance are audited. The exercise enriches the performance of partner institutions and contributes to proper management of teaching and learning.

4.7.1. Digital library

74. In addition to academic resources, students access the AVU digital library and the RMIT digital library. Both libraries provide electronic books in Computer Science and e-journals. The AVU digital library enhances the teaching and learning for AVU's degree and diploma programs.

4.7.2. Examination processes

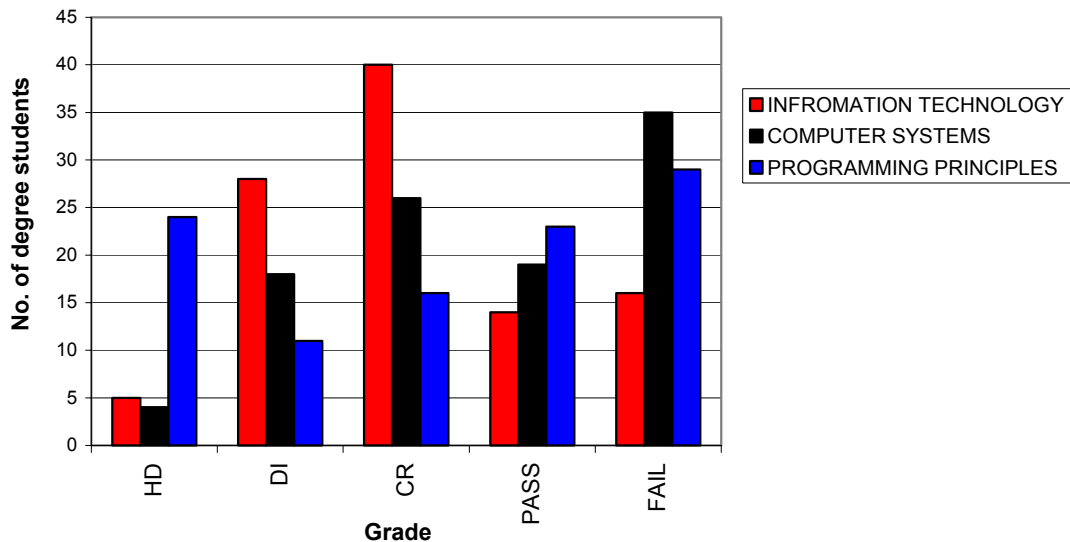
75. Examination papers and marking guides are produced by RMIT and forwarded to the director of the learning center via the WebCT learning platform.

76. The learning centre director/manager must ensure that:

- All examinations are correctly invigilated.
- Facilitators have sufficient time for marking exam papers.
- Final marks are submitted to WebCT in a timely manner
- Inform AVU and RMIT when all marking processes are complete (or report to AVU and RMIT any delays with the marking processes)
- When results are finalized by RMIT, are given to students in a timely manner.

77. The first cohort of the degree program completed its first semester examination in July 2003. Students performed very well in the examination compared to RMIT standards. The figure below indicates performance in degree program:

Chart Degree subjects performance by grade



Key:

HD High Distinction
DI Distinction
CR Credit
PASS Pass
Fail Fail

4.8. Challenges

78. Although AVU has experienced tremendous success in providing quality education in Africa, there are a number of challenges that continue to impede the implementation of its programs. These include technical operational, human resource and attitudinal problems. At the technical and policy levels AVU and its partner organizations face a number of challenges (Juma [2001]).

- *Scarcity of Computing Resources:* Computing resources, both hardware and software are expensive for any university to afford in reasonable quantity and quality. Technology is very dynamic and some universities cannot cope with these changes in terms of cost and relevancy. There is also the significant problem of equipment maintenance and replacement to be faced. (Aguti [1997], for example, pointed to lack of local technicians able to repair equipment at the AVU site in the Makerere University, Kampala).
- *Slow Internet Connectivity:* AVU relies heavily on the Internet for the delivery of academic courses, its digital library, the portal, and many other products. Unfortunately, slow Internet connection and low bandwidth in some of the African countries reduce the effectiveness of AVU courses. Increasingly the issue of high costs for large bandwidth (pipes) is also a problem.
- *Communications Policy:* Due to high international tariffs and lack of circuit capacity, obtaining sufficient international bandwidth for delivering web pages over the Internet is still a major problem in some African countries. The problem is enhanced by National Telecom sectors having a monopoly on international bandwidth, so that local Internet Service Providers (ISPs) are dependent on them. This poses a major challenge to the proper functioning and delivery of AVU products in some countries. For instance, AVU hopes to install VSAT capabilities in some sites to deliver content from Africa to other AVU sites. Unfortunately, this might be hampered by communication regulations in some African countries that do not allow Two-Way satellite based Internet services using very small aperture terminals (VSAT).
- *High Telecommunication Costs*
- *Lack of Capacity in Information Communication Technology (ICT) Skills:* Most university academics and students have very low skills in ICT, to the extent that AVU's digital library and many other products are not fully utilized by university faculty members.
- *Attitude towards Technology Enhanced Learning:* Many academics from universities in Sub-Saharan Africa do not believe that quality education can be delivered through information technology, and some of them are very slow in changing attitude towards this kind of modern Distance Education. Indeed many scholars cannot easily adopt 'a mind set' that appreciates that digital literacy is an important dimension of learning, like reading and writing.

4.9. Prospects

4.9.1. Higher studies at university level

79. With current gross enrolment rates in the states of Sub-Saharan Africa among the lowest in the world, AVU will undoubtedly contribute to raising of enrolment levels, particularly in computer science and computer engineering. Data from the eighteen countries participating in AVU programs shows the low level of university enrolments in these countries. The number of students enrolled in universities (618,000) is only 4.7 per cent of the total 13 million students enrolled in secondary level education. A large number of students who do not get into university meet the minimum university requirements to enter University. For example, in 2003, University of Cape Coast, there were 400 applicants for the department of Computer Science and only 30 were admitted (CS Dept, Cape Coast, 2002). In 2003, the Kenya Joint University Admission Board selected 11,000 students out of 40,000 qualified candidates for 6 national universities, (Joint Admission Secretariat, Records, 2003).

80. This situation is particularly alarming given the importance of computer science and engineering in the new 'knowledge economy'. Experience in East Asian countries and India provides evidence that a critical mass of professionals in these areas drives economic growth and creates employment opportunities. The recent economic success of India's software industry can be traced to the nation's ability to anticipate global trends and quickly build a critical mass of well-educated professionals (World Bank/UNESCO 2000).

81. As a result of these low enrolment levels, a large number of students – the wealthiest or those who are fortunate enough to get a scholarship – go abroad to study. In the first half of the 1990s, approximately 56,000 students from AVU's current countries of operation (the total for Africa as a whole was 192,600) were studying abroad, mainly because similar educational opportunities were not available in their countries. Of the African students studying at the undergraduate level in the USA, 22 per cent were enrolled in engineering, computer science or mathematics. This situation has led to a significant brain drain of talented Africans (AVU 2000:3).

82. The practice is also costly for parents. Kenyan parents are forced to spend very significant sums to educate their children abroad, particularly in computer science, computer engineering, and electrical engineering. For example, in 1998 they spent about Kenya shillings 1.5 million (US\$19,997) per year per student to support children studying in America, and about 1.2 million (US\$16,000) per year per student to support those studying in the United Kingdom. On average, there are about 6000 Kenyans studying abroad, with the majority in America and Britain and few in other countries (Nation Newspapers, 12th July 1998). This implies that the country is losing a lot of money on foreign education, and does not augur well for sustainable development.

83. The AVU model will therefore, assist in tapping potential offered by new technologies to overcome some of the financial, physical and information barriers that prevent increased access to high quality education in Kenya and sub-Saharan Africa.

4.9.2. Opening up opportunities for women in science and engineering

84. Through its Pre-university Program, AVU is one of the major innovations enhancing the level of female participation in computer science and computer engineering. The AVU's Pre-University program not only offers opportunities for young women to enjoy learning; it also helps to upgrade their skills in sciences, so that they can enroll for computer science, computer engineering, and electrical engineering courses – all of which have traditionally been regarded as 'male subjects' AVU will thus help to counteract the low enrolment levels of women in science-based courses in Africa.

4.9.3. Capacity building

85. AVU has contributed immensely towards building capacity in computer literacy skills through its extensive short computer certificate courses. All the initial sites set up during the pilot phase saw significant numbers of university administrators, professors, lecturers, postgraduate students, high school graduates, medical doctors, and executives take its computer courses.

86. Currently employers from the private sector and from NGO's are faced with a huge need to train their employees. Most companies usually call upon local providers of training, usually small firms of uneven quality. Evidence collected during a market survey conducted by AVU in Kenya in 1999 demonstrated that corporations are generally dissatisfied with local providers of training (AVU 2000:6). Some foreign investors train their newly recruited staff overseas, but this is very expensive. Every year, Citibank in Nairobi sends 5 employees overseas to enroll in MBA program and a few of its employees to Citibank's training center in Istanbul. Citibank is looking for more cost-effective ways to train its staff because the needs are huge and costs are high. Citibank is one of the fourteen corporations to have expressed a readiness to invest in setting up AVU learning centers at their premises, to provide professional development education to their workers. Firms are particularly interested in computer training and management courses (notably at MBA level) through distance teaching so that employees do not take time off their jobs.

87. AVU will also assist universities and AVU sites in building faculty capacity in ICT-enhanced learning. Under an AVU/AusAID partnership known as the Virtual Colombo Plan¹, AVU partner universities' faculty will be trained in Instructional Design for online teaching/learning. Scholarships for master's degrees, diplomas and certificates in Instructional Design will be provided to a cohort of 12 academics to specialize in ICT-enhanced learning. This team of experts will then extend the training to their respective universities, and eventually, it is hoped, the teaching and learning in both distance institutions and conventional universities in Africa will improve thus leading to an expansion in the number of courses offered through modern technologies.

¹ The Virtual Colombo Plan was announced by the Australian Minister for Foreign Affairs, Alexander Downer, in a speech delivered in Sydney on 2 August 2001 at the launch of the project (Downer 2001). Under the plan Australia is committed to providing 200 scholarships annually for primary and basic education teachers and teacher trainers wishing to enroll on Internet courses provided by Australian institutions; to supporting distance education programs aimed at upgrading teachers' skills in twelve months.

4.9.4. Enhancement of job opportunities

88. Evidence from the AVU-Kenyatta University Centre (Juma 2000) indicates that many AVU graduates have secured jobs in Kenya in the rapidly growing Internet technology company sector (for example, in enterprises such as Africa online, the Nation Media Group (Company), Nairobi net, computer technology training institutions, and cyber cafes). More generally, employers have confidence in AVU graduates and are actively seeking to employ AVU graduates.

5. CONCLUSION

89. As the last section indicates, AVU still faces some challenges, yet the use of electronic media could have an enormous impact on the delivery of accredited degree programs and training in Sub-Saharan Africa. But for AVU to succeed in Africa, governments, universities, industries and NGO's all have a role to play as stakeholders.

90. AVU is now well positioned on the African continent to deliver its mission and build capacity in relevant technological skills. The organization has focused its strategic priorities with its partners to contribute immensely in complementing services being provided by universities on the continent.

5.1. Recommendations

- Advocacy and lobbying at decision making level by Ministers of Education to improve IT (Information Communication Technology) infrastructure and communication policies at the continent and country levels.
- Ministries of Education to include AVU requirements in budgetary allocations to universities.
- The national bursary fund/scholarships/loans scheme be extended to poor AVU students.
- Donor funds to universities should be used to improve facilities and materials and AVU learning centers.
- Universities to mainstream AVU in the overall administrative framework of universities.
- Government loans/grants for education from World Bank/Donor Agencies should include specific grants for the AVU learning centers.
- NEPAD (New Partnership for Africa's Development) should incorporate AVU as its flagship for capacity building in Africa and allocate funds accordingly.

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