INTEGRATION OF INFORMATION COMMUNICATION TECHNOLOGIES (ICTs) IN THE DISTANCE EDUCATION BACHELOR OF EDUCATION PROGRAMME, MAKERERE UNIVERSITY, UGANDA

Jessica N. AGUTI
Department of Distance Education
Makerere University of Uganda, UGANDA

William J. FRASER
Department of Curriculum Studies, Faculty of Education
University of Pretoria; SOUTH AFRICA

ABSTRACT

This article reports on the problems experienced by the Department of Distance Education, Makerere University, Uganda with the B.Ed. (External) programme with specific reference to the technology needs and expectations of the programme. With a total enrolment of nearly 3,500 students in 2003, this programme was one of the largest distance education programmes for teachers in the country.

It was therefore important to establish what technologies the stakeholders of this programme had access to, what technologies they believed could be used for the programme and for what purpose, and finally what prerequisites should be put in place for this technology to work. The article reports on the availability of and access to ICTs, access to telecommunications and sources of funding for ICTs in the distance education programme.

The authors also looked critically at a number of prerequisites thought to enhance the effectiveness of ICTs in the B.Ed. (External) programme from an African perspective hoping that the integration of ICT in the programmes would lift the distance education mode of delivery of these programmes from a classical first and second generation, to a third generation level of operation.

Keywords: In-service education and training; teacher training programmes; distance education; information communication technologies (ICT).

INTRODUCTION

The growth of distance education has been associated with Information Communication Technologies (ICTs) although the choice of technologies to use depends on a variety of factors including the '*desirability, feasibility, affordability and sustainability*' of such technology (Haddad and Jurich 2002:55).

In Uganda, and in Makerere University in particular, a number of programmes including teacher education have been offered using distance education However many of these programmes have not fully utilised a variety of technologies but have largely depended on first generation print and on second generation face-to-face sessions. There have been some efforts at integrating computers in education.

For example WorlDLinks has worked in schools encouraging teachers and students to use computers for teaching and learning whereas ConnectED was applied in Teachers' Colleges. These efforts imply that although still under utilised, technology has an important role to play in education and training in the country.

Makerere University's B.Ed. (External) is a programme specifically developed for upgrading teachers to the bachelor's level. With a total enrolment of nearly 3,500 students in 2003, this programme is the largest distance education programme for teachers in the country. It was therefore important to establish what technologies the stakeholders of this programme have access to, what technologies they believe can be used for the programme and for what purpose, and finally what prerequisites should be put in place for this technology to work.

Integration of the ICTs in the programmes would lift the distance education mode of delivery of these programmes from a classical first and second generation, to a third generation level of operation.

METHODOLOGY

A quantitative approach was selected for the study focusing on the development of structured questionnaires to be used as instruments for the gathering information from students participating in the B.Ed. and Bachelor of Science (External) programmes, prospective students of the B.Ed. (External) programme and information from tutors, managers and administrators of the B.Ed. (External) programme.

A structured interview schedule was constructed to access information from policy makers at the Ministry of Education and Sports, District Education offices, National Teachers' Colleges, Primary Teachers' Colleges, Makerere University and Kyambogo University. A total of 321 respondents participated in this study and they were drawn from different districts namely Soroti, Tororo, Masindi, Mbarara, Kampala, Entebbe, Wakiso, and Mpigi.

The data gathered were then analysed using descriptive and inferential statistics; and presented descriptively, in tables and in graphs.
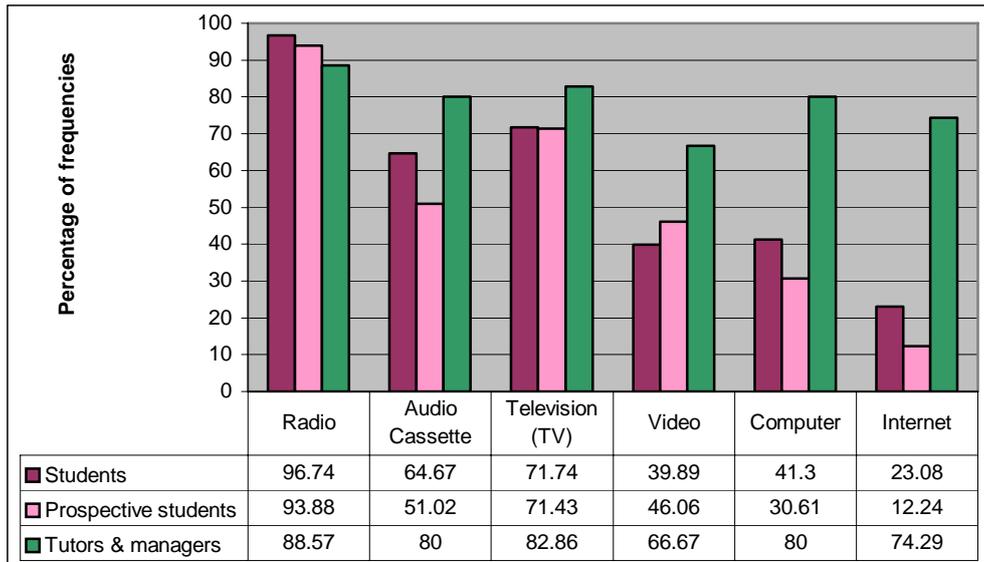
ACCESS TO ICTs

Access to ICTs is one of the major factors that must be taken into account when choosing the technology to be used (Bates 1994:1577, De Wolf 1994:1561, Meyer-Peyton 2000:85). A list of only some ICTs was provided and the respondents were asked to indicate whether they had access to it or not.

They were also asked to indicate the location of this access as this predetermines the availability of the technology for study purposes. Figure 1 provides information on the percentage of the respondents who have access to different ICTs and Table 2 the places where the ICTs can be accessed.

To establish whether there is a significant difference in access to technology particularly by students, tutors and managers, a chi-square test was used with a selected level of significance at $p \leq 0.05$. The result of the test indicates that there is no significant difference with regard to access to the audiocassette (p= 0.0769) and to television (p= 0.1718) although a higher percentage of tutors and managers have access to both technologies.

However, the result of the same test with regard to access to the video (p=0.0043), computers (p=0.0001) and Internet (p=0.0001) showed a highly significant difference in access. In all three technologies, only a small percentage of the students have access. Internet has the lowest percentage of students (23.08%) having access to it.

Figure: 1
Frequency of students', prospective students', tutors' and managers' access to ICTs

It is therefore important to note that, according to the results of this study, nearly 60% of the students and prospective students do not have access to video, computer and to Internet so decisions on what technology to use and how access is to be provided must take this into consideration. Nevertheless, even in the case of those students that indicate that they have access, only 3.39% have access to computers at home and 1.16% to Internet at home (see Table 2 for details). Table 1 illustrates the frequencies and percentages of the respondents that do not have access to ICTs whereas Table 2 shows the ICTs and where each can be accessed.

Table: 1
Frequency of students, prospective students, tutors
and managers who do not have access to ICTs

ICT	Students		Prospective students		Tutors and managers	
	F	%	F	%	F	%
Internet	140	76.92	43	87.76	9	25.71
Video	110	60.11	26	53.06	11	33.33
Computer	108	58.7	34	69.39	7	20
Audio Cassette	65	35.33	24	48.98	7	20
Television (TV)	52	28.26	14	28.57	6	17.14
Radio	6	3.26	3	6.12	4	11.43

A number of other places where the ICTs can be accessed were also identified and these include:

- ➤ **Hotels/bars**
- ➤ **Schools**
- ➤ **Private Computer Centres/Business Centres**
- ➤ **Internet Cafes**
- ➤ **Post offices**
- ➤ **Work places**
- ➤ **TDMS Coordination Centres**

With the exception of the TDMS Coordinating Centres all these places belong to the private sector. Although the numbers accessing the ICTs at these places is minimal this implies that the private sector plays an important role as potential partner in the provision of access to ICTs. Makerere University therefore needs to explore this further.

Table: 2
Percentage of students, prospective students, tutors
and managers, and their access to ICTs

| ICT | CATEGORY | PLACE OF ACCESS TO ICTs | | | | |
		Home	Friend's Home	Relative's Home	Office	MUK
Radio	Students	97.28	25.00	24.46	19.57	8.20
	Prospective Students	93.88	28.57	32.65	10.20	8.51
	Tutors & Managers	91.67	8.33	8.33	27.78	22.22
Audio Cassette	Students	59.02	20.77	17.49	10.38	8.24
	Prospective Students	53.06	16.33	20.41	6.12	0
	Tutors & Managers	77.78	8.33	8.33	11.83	11.11
TV	Students	57.87	27.53	24.16	8.43	13.48
	Prospective Students	55.10	32.65	34.69	4.08	2.08
	Tutors & Managers	91.67	11.11	5.56	8.33	11.11
Computer	Students	3.39	5.65	7.91	26.55	27.12
	Prospective Students	10.20	16.33	2.04	20.41	6.38
	Tutors & Managers	19.44	0	2.86	62.86	31.43
Internet	Students	1.16	0	1.16	8.67	21.39
	Prospective Students	2.04	4.08	2.04	8.16	4.26
	Tutors & Managers	2.78	0	0	37.14	40.00

This study has also shown that personal ownership of most of the ICTs listed in this investigation (with the exception of the radio) is clearly limited and that few students, prospective students, tutors and managers have access to computers and Internet.

Table: 3
Uganda's access to telecommunications

Technology	1999	July 2000	February 2001
Fixed Telephone Lines	58,000	61,000	56,149*
Mobile Phone	70,000 (subscribers)	140,000 (subscribers)	210,000 (subscribers)
Internet/email (wireless)	N/A	500 (subscribers)	1,200 (subscribers)
Television Stations	11	11	19

*Source: Republic of Uganda (July 2002:8). By February 2001 the number of fixed telephone lines had decreased significantly and one reason could have been the steady increase in mobile phone subscriptions.

This is consistent with what is expressed by the Republic of Uganda (July 2002:8,17) that indicates that by February 2001 Uganda had only 1,200 Internet/Email subscribers using wireless access and 4,500 using the dial-up access. It was estimated that in 2001 1,000 people had access to one computer in Uganda. See also Table 3 that indicates Uganda's access to various technologies.

Uganda clearly has poor access to ICTs. No programme should therefore be developed based on the assumption that students will have personal access to video, computers or to Internet.

Alternative ways of ensuring access should instead be considered. Policy makers were asked to consider this question and suggest ways in which the ICTs can be made more accessible. According to them, this could be achieved as follows:

> Collaboration with various institutions in order to avoid duplication of efforts and wastage of resources. In collaborative ventures, institutions would pool resources and run common centres. This collaboration should also extend to the public and to the corporate sector namely the different TV and radio stations.
> Establishing well-equipped centres. Since personal ownership is difficult, centres should be established where the distance learners can access the technology. These centres could be university centres, district resource centres or even schools/colleges (Perraton and Creed 2001:13).
> Careful planning of programmes. This should include proper planning and budgeting for the provision of the technology. For example, since access to Internet is poor, the use of CD-ROMs could be explored.
> Government subsidies and support. Government support in the form of subsidised cost of equipment and technology and waiver of taxes on this equipment.
> Personal ownership. Encourage students to own radios and audiocassettes.
> Investing in integration of ICTs. Distance education providers must be willing to invest in ICTs and the budget should demonstrate this willingness.

Table: 4 provide the results of the policy makers' views in how ICTS could be made more accessible to users.

Table: 4
Policy makers views on how ICTs can be made more accessible

How to make ICTs more accessible	F	%
Well equipped centres/schools	30	45.45
Collaboration	23	34.85
Government subsidies and support	5	7.58
Planning of programmes	3	4.55
Funding of acquisition of ICTs	2	3.03
Personal ownership	2	3.03
Involving the private sector	1	1.52

Access to all ICTs is still a huge problem in Uganda as shown in this discussion. The majority of students do not have access to video, computer and Internet whereas a higher proportion has access to radios and audiocassettes.

Clearly if Makerere University is to fully integrate ICTs in its B.Ed. (External), a model based on personal ownership of video, computer and Internet will not be appropriate. A model that exploits provision through centres and sharing of facilities is likely to promote

higher access to the technology for particularly the students (Bates 1994:1577, De Wolf 1994:1561, Perraton and Creed 2001:13).

USE OF ICTs IN THE BACHELOR OF EDUCATION (EXTERNAL) PROGRAMME

ICTs have a huge potential of enriching distance education because they can:

> - According to Moore (1996:24), Peters (1996:51), and Bates (2000:16), enable the teacher and learner to bridge the distance between them.
> - According to Tschang and Senta (2001:6), be used to get the '...*right types of content and learning to the individuals...'* and to this end have been used for the production of study materials for distance learners.
> - Be used to improve learning (Bates 2000:16, Tschang and Senta 2001:6).
> - Enhance management and administration of distance education (Paul 1990: 124).

The government of Uganda also recognises the importance of ICTS in *'...national development, especially human development and good governance...'* (Republic of Uganda July 2002:21) and has therefore as its goal:

> To promote the development and effective utilisation of ICT such that quantifiable impact is achieved throughout the country within the next 10 years (Republic of Uganda July 2002:21).

Policy makers in this study were asked to air their views regarding the use of ICTs in teacher education programmes provided by distance education in the country. This question was specifically addressed to this category because as a vital group in policy making, any innovation in the education system needs their support and involvement if it is to succeed. From their responses, whereas the policy makers are keen to have ICTs integrated in teacher education programmes in general and in Makerere University in particular, there is also recognition that the cost of the technologies, and therefore access, to these constitute a huge challenge. It is therefore vital for the government and teacher educators to carefully and deliberately plan for this integration taking into careful consideration the basic prerequisites necessary for this to work.

Prerequisites for effective and efficient integration of ICTs
The prerequisites identified are presented in Table 5 and each of them is briefly discussed in the next subsections.

<div align="center">

Table: 5
Prerequisites for effective and efficient integration of ICTs

</div>

Prerequisite	F	%
Training and sensitisation of staff and students	38	33.04
Access to the ICTs by all users	16	13.91
Adequate funding for acquisition and maintenance	13	11.30
Electrification or access to alternative power	13	11.30
Policies and guidelines at national and institutional levels	6	7.83
Collaboration and networking with other institutions and departments	6	7.83
All the required equipment	20	17.39

Training and sensitisation of staff and students
Access to technology should be accompanied by knowledge and skills for its use. To achieve this, 33% of the policy makers recommended training and sensitisation of all the users. According to them, it is vital to have 'qualified staff to run and manage the technology' and tutors should be able to '...effectively use the equipment'. Equipping centres is therefore not sufficient, all users must be sensitised and trained. According to

one officer, it is vital to 'transform the teacher trainers by training them in the use of technology. For, unless the teachers themselves are exposed and have knowledge it is a waste of time to distribute computers to schools'.

Bates (2000:77) identifies human support for technology infrastructure as critically important. According to him, this human support includes the *'...technology support people... media and production and services people...instructional design staff... subject experts...'* All these different people need to be identified and trained to fulfil their different roles.

Access to ICTs by all users

The importance of access to ICTs has already been discussed in section 2 and in this study, 13.91% of the policy makers who answered this question, identified access as one of the core prerequisites that must be put in place before the technology is chosen and used. According to them, for the technology to be effectively used, all users–students, writers, tutors and managers and support staff–should have access to the technology chosen for use in the distance education programmes. This also implies that all the necessary equipment for the technology to work should be made available.

Access to technology in Uganda is still a challenge because, for example by 2001 Uganda had only 2 telephone mainlines per every 1,000 persons whereas only 2.5 out of every 1,000 persons were internet users (UNDP 2003:276). Moreover according to the Republic of Uganda (July 2002:17), it is estimated that only 1 in every 1,000 persons has a personal computer and that even in organisations, there are *'...very few LANs ...and there are hardly any WANs'.* Deliberate plans should therefore be in place for the acquisition of this equipment and efforts to ensure that all users have access. According to the policy makers, in this study, this can be achieved through:

> ➢ Provision of 'technologies in schools as well so that the teachers can continue to use these technologies'. Perraton and Creed (2001:55) suggest that this can be achieved through governments or international agencies' support.
> ➢ Establishing 'satellite centres where these services can be provided'. LEARN Foundation in Bangladesh for instance used this strategy by supplying some computers to village schools (Perraton and Creed (2001:55). The African Virtual University could also be said to be using this strategy since it has satellite centres in different universities in Africa.
> ➢ 'Departmental website with all the necessary data'. A quick survey of the Internet will reveal many universities with websites where basic information can be found on courses, admission requirements, procedures and key contacts.

A number of authors have identified access to technology as an important factor (Bates 1994:1577, Meyer-Peyton 2000:85, Perraton, Creed and Robinson 2002:45). Planners should hence be concerned about access to the technology for all the users. It would be futile for instance to choose to use any technology if the students do not have access to it.

Adequate funding for acquisition and maintenance

Investment in technology in any distance education programme is one of the high costs (Bates 2000:19, Berge 2001b:19, Orivel 1994:1572). It is therefore imperative that funds for this be made available. Eleven point three per cent of the policy makers in this study were also of the opinion that funding for acquisition and maintenance of equipment is a prerequisite for the integration of technology in teacher education programmes. Furthermore, it should be remembered that there might be 'need for massive investment to start with'.

Electrification and alternative sources of electricity

Perraton et al. (2002:45) for instance identify access to electricity or alternative sources of electricity as one of the prerequisites for the use of ICTs. However in Uganda access to electricity is still very poor - with 89.7% of its energy use being derived from traditional sources of fuel like firewood. This compares poorly with high-income countries that have only 3.3% of energy use from traditional sources (UNDP 2003:214-215). Since most of the ICTs require electricity to operate, availability of either electricity or alternative sources of power is a prerequisite. This is much more urgent in the rural areas where access to electricity is even more limited. Providers of distance education programmes in Uganda therefore need to make allowance for access to electricity or to alternative sources of electricity when planning the integration of ICTs.

Policies and guidelines

According to Haddad and Jurich (2002:49) *'in planning a technology-mediated project for education, attention must be paid to the laws and regulations that will affect the project...'* seven point eighty-three per cent of the policy makers in this study agree with this for according to them, for teacher education programmes to successfully integrate ICTs, there must be policies and regulations that will facilitate this. In the words of one official, there is need for a 'clear vision, policy and plan for integration of ICTs'. One of them recommended that a National Communications System be established to ensure coordination of facilities and service.

The Republic of Uganda (July 2002) has already developed a National Information and Communication Technology Policy and Makerere University has also developed an Information and Communication Technology: Policy and Master Plan. Makerere University's vision in this regard is:

> '...university wide access to, and utilisation of information and communication technology to enhance the position of Makerere University as a centre of academic excellence, and its contribution to sustainable development of society' (Makerere University February 2001).

The Department of Distance Education therefore needs to utilise this framework to develop guidelines that will support successful integration of ICTs.

Collaboration and networking with other institutions and departments

The policy makers in this study were also of the opinion that Makerere University can ensure access to technology for its B.Ed. (External) students through collaborating and networking with other institutions and departments. While discussing access in b) above, the policy makers for instance identified schools as places where teachers could access ICTs. This is one example of institutions that Makerere University could collaborate with. So according to the policy makers in this study, for ICTs to be successfully integrated into teacher education, it is vital to ensure the following:

> ➢ There is access to the ICTs by all users and that the required equipment is available.
> ➢ There is adequate funding for acquisition and maintenance.
> ➢ Training and sensitisation of staff and students is carried out.
> ➢ There is electrification or access to alternative power especially in the rural areas.
> ➢ Policies and guidelines are in place at both national and institutional levels.

This is in agreement with what Haddad and Jurich (2002:43) consider as prerequisites for according to them there must be *'...access, acceptance, and availability'* which, put together encompass all that has been raised here by the policy makers.

ICTs that can be used for B.Ed (External)

Taking into account the environment in Uganda in which the B.Ed. (External) is offered, all the respondents were asked, using a YES/NO question to indicate which technologies could be used for B.Ed. (External) activities. The respondents were given a choice of seven different technologies i.e. radio, television, video, computer, Internet and print. These different technologies are currently available in the country and it is for this reason that they were chosen. Figure 2 indicates the results of the responses to this question. According to these results all technologies can actually be used in the country. Nevertheless it is worth noting that print had the highest number of responses by tutors (94.44%), whereas for students and prospective students this was the radio 77.35% and 73.47% respectively.
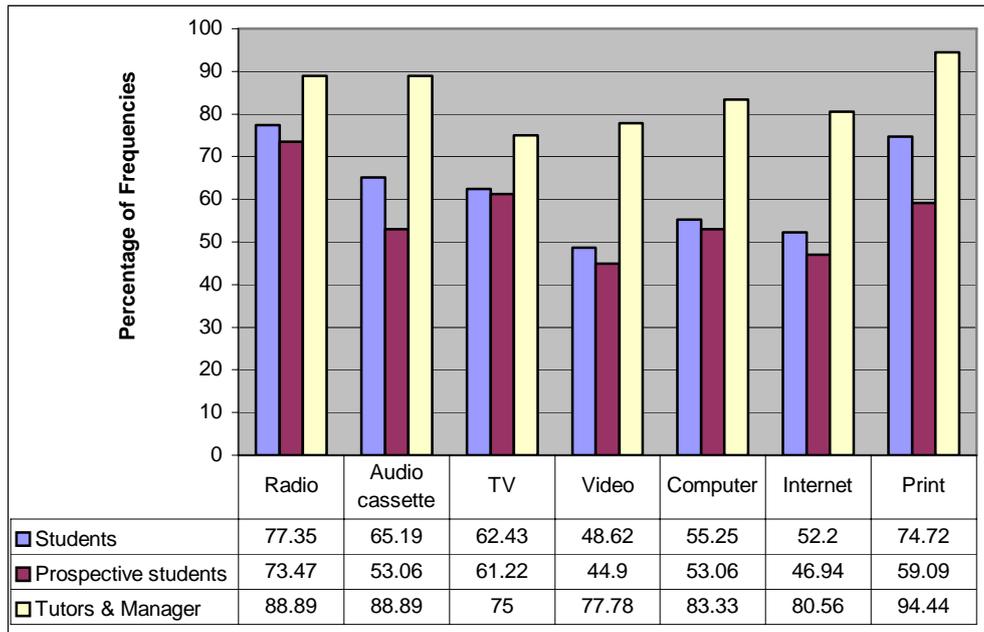
	Radio	Audio cassette	TV	Video	Computer	Internet	Print
Students	77.35	65.19	62.43	48.62	55.25	52.2	74.72
Prospective students	73.47	53.06	61.22	44.9	53.06	46.94	59.09
Tutors & Manager	88.89	88.89	75	77.78	83.33	80.56	94.44

Figure: 2
Frequency of Respondents' views on ICTs to be used for B.Ed. (External)

Reasons for choosing the ICT for use in the B.Ed. (External)

Although technology is important and has the potential to enrich teaching and learning, it should not be chosen just for the sake of it and neither should it be chosen simply because it is available (Juma 2001:294). Technology should be treated as a medium, *'...a servant not a master...'* (Tooth 2000:2). This study was therefore concerned with establishing how the B.Ed. (External) programme can benefit from ICTs. All the respondents in this study were asked (using open questions) to give reasons for choosing a particular technology for use in the programme activities. According to the responses received, the following reasons were given:

> ➢ Accessibility of the technology.
> ➢ For purposes of acquiring information and for communication.
> ➢ The technology's potential to enrich and reinforce learning.
> ➢ The transmission of special knowledge and skills.
> ➢ Versatility of the technology.

There is a close relationship between what the policy makers put forward as prerequisites and what is mentioned here as reasons for choosing a technology.

Accessibility of the technology

This refers to how easily students, tutors and managers in a distance education programme can have and use the technology. For example the radio was selected for use because according to one tutor, 'virtually all the students have access to radio'. The other issues of accessibility raised in this study include:

> - The technology's potential use for mass education. The radio and TV were for instance said to be suitable for this. Holmes et. al. (1993:141), Perraton and Creed (2001:14) all say that radio and TV have been used for broadcast programmes in a number of distance education programmes.
> - Access to the technology by those who live in the rural areas. Most rural areas do not have access to electricity but the radio and audiocassette can still be used in these areas unlike TV that may not be easily accessible in the rural areas. This confirms what Thomas (2001:2) says, for according to him, *'...most people, even in the poorest rural areas, have access to radio...'*
> - Flexibility in use. The audio and the video can be used at the learner's convenience without being limited by hours of transmission, as is the case with radio and TV programmes.
> - Simplicity of the technology. Radio, audiocassette and print were said to be simple technologies that can be easily utilised unlike Internet that may require more complex knowledge and skills before a learner can utilise it.

So, according to the respondents in this study, the choice of a technology to be used should be dependent among other things on how accessible the technology is to all its users.

Acquisition of information and for communication

Information dissemination and communication were identified as an important element in any distance education programme. I believe it is for this reason that choice of the technology was said to be dependent on its potential for information dissemination and communication. With this in mind, a high percentage of students, prospective students as well as tutors and managers were of the opinion that radio and the Internet could be used particularly for this purpose.

Enrich and reinforce learning

Technology chosen should be the kind that will support the course content and enable effective learning to take place. So the technology should not be used simply because it is available but because of the potential it has to enhance teaching/learning (Bates 2000:16, Juma, 2001:294, Meyer-Peyton 2000:84). According to Mcloughlin and Oliver (1999:37) different technologies can support and promote acquisition of different skills, and therefore choice should be dependent on the expected learner outcomes.In this study a number of respondents regarded this as important and considered that it should be a reason indeed for choosing any ICT. According to the students, the audiocassette, TV, video and print should be used because these can enrich and reinforce learning. In the words of some tutors and managers, the radio would 'make learning more interesting and real', whereas with TV, 'audio-visual impressions liven up study and make students feel they are in touch with the presenter'.

Acquisition of special knowledge and skills

According to McLoughlin and Oliver (1999:37) different technologies can help promote different approaches to teaching and learning and can help achieve different learning outcomes. In this study, although all the ICTs were chosen because they can be used to achieve special knowledge and skills, according to the students and the tutors and managers, the radio would be useful in the teaching of languages and communication skills, the video/TV for demonstrations and practical skills, and the computer for data processing, writing skills and information search.

Versatility

This refers to the ICTs flexibility or adaptability for use. For example the computer and Internet were said to have a huge potential for multiple or varied use including 'keeping records', 'printing study materials', 'accessing international information' and 'analysis of information and data'. This confirms what Tschang (2001:20) says of Internet that, according to him, it can be used to store and access vast quantities of knowledge. The results of this study indicate that any ICTs can be used for teaching/learning but the choice of which ICT to use, should be dependent on how accessible and versatile the technology is and on what learning outcomes are expected from the teaching/learning experience. The technology should not be used simply because it is available.

Strategies for financing the integration of ICTs in the B.Ed.

The cost of ICTs is one of the factors that affects choice of the ICTs and so its financing must be carefully planned right from the initial planning for the course (Bates 2000:19, Berge 2001b:19, Meyer-Peyton 2000:85, Orivel 1994:1572). As already mentioned, according to the policy makers who participated in this study, funding is one of the prerequisites for the integration of ICTs in teacher education programmes run when using distance education. The B.Ed. (External) relies almost entirely on student fees for the funding of all running costs of the programme and in its budgeting, the Department allocates only 7% of its total funds for equipment such as computers, printers, photocopiers, and their accessories. From income derived from the B.Ed. (External) programme alone, this amounts to about US$35,000. Therefore if this were spent on computers alone, at the cost price of US$1,000, only 35 computers could be purchased! However, according to the University ICT policy:

> It is the University Policy to ensure and require that all students, academic staff, administrative and support staff, and managerial staff are trained on a continuing basis to equip them with the requisite skills to fully exploit the ICT environment in their different functions' (Makerere University February 2001:18).

If this policy is therefore to be implemented, the Department needs a big Local and Wide Area Network of computers in order to effectively and efficiently reach its nearly 3,500 B.Ed. (External) students, many of whom are scattered across the country. This is a challenge that the Department is unlikely to meet from the meagre income it earns from fees.

This clearly is a challenge and consequently the respondents were asked to suggest ways in which this integration could be funded. From the list of options mentioned, the highest number of respondents was of the view that this funding should come through government subsidies to the programme, from the donor community and from tuition fees already levied by Makerere University. The least number were of the view that additional charges could be introduced. See Table 6 for details.

Table: 6
Frequency of respondents' views on sources of funding for ICTs in the B.Ed. (External)

Source of Funding	Students		Prospective students		Tutors & managers		Policy makers	
	F	%	F	%	F	%	F	%
Government subsidies	143	83.14	46	93.88	30	85.71	22	66.67
Donor community	141	81.50	36	73.47	30	85.71	19	57.58
Tuition fees	98	56.32	25	51.02	24	66.67	21	63.64
Local community support	67	38.95	17	34.69	17	48.57	10	30.30
Additional charges	21	12.21	8	16.33	16	45.71	18	54.55

In addition, a number of other strategies were identified and these are:

> ➢ Fundraising activities that would help the university raise supplementary funds.
> ➢ University savings.
> ➢ The University should identify money-generating projects.
> ➢ Students in particular should be encouraged to acquire individually some of the technology, especially the radio and audiocassettes.
> ➢ Some schools already have some of the technology so students could make use of this. Moreover schools could be encouraged to acquire the technology.
> ➢ Involving the private sector in order to help the university acquire the technology.
> ➢ Students could also, through cooperative groups, jointly acquire the technology.
> ➢ Loan schemes for students to help them purchase the required technology.

These results reveal that funding of ICTs remains a challenge that Makerere University should plan carefully in order to deal with it. Funding ICTs requires much concerted effort by all stakeholders and much creativity and innovation by Makerere University.

CONCLUSION

Integration of ICTs is absolutely imperative in distance education. This article has shown that ICTs have a huge potential in meeting a number of teaching/learning functions in the B.Ed. (External). However, in Uganda, access to the ICTs, which is one of the prerequisites for the integration, is still a huge problem to students and staff of this programme. Personal ownership of the video, TV, computer and Internet is limited so programmes that presuppose personal ownership of these ICTs cannot work effectively and efficiently. Alternative ways of ensuring access would have to be utilised and in this study, collaborative ventures, use of centres and government subsidies are some of the strategies that have been suggested. The same applies to financing of the integration; alternative sources of funding have to be solicited since the existing tuition fee funding is inadequate. This should all be done bearing in mind the fact that technology should not be chosen and used simply because it is available, but because of what it can add to the teaching/learning experience. It should be based on the tasks it will be expected to perform and the outcomes expected from the programme.

BIODATA and CONTACT ADDRESSES of AUTHORS

William J. FRASER is Head of the Department of Curriculum Studies, University of Pretoria and specialises in distance education, the teaching of biology, assessment and quality assurance and teacher education in general.

He is a chartered biologist, Member of the Institute of Biology, and Member of the South African Academy of Science and Arts.

Prof. William J. FRASER
Department of Curriculum Studies, Faculty of Education
University of Pretoria, Groenkloof Campus, Pretoria.
Email: william.fraser@up.ac.za

Jessica AGUTI teaches in the Department of Distance Education at the Makerere University of Uganda and has mainly been responsible for the development of INSET

12

programmes at this university. She graduated from the University of London (Masters in Education and Development: Distance Education) and the University of Pretoria (PhD).

Dr. Jessica N. AGUTI, Department of Distance Education, Makerere University,
P.O. Box 7062, Kampala, Uganda. jaguti@avu.org

REFERENCES AND SOURCES CONSULTED

BATES, A. W. (1994). Distance Education, Educational Technology, Husen, T. & Postlethwaite, T.N. (ed), *The International Encyclopaedia of Education*, Oxford: Pergamon. Second Edition, 3, 1573-1579.

BATES, A. W. (2000). *Managing Technological Change: Strategies for College and University Leaders.* San Francisco: Jossey-Bass Publishers.

BERGE, Z. L. (2001). A Framework for Sustaining Distance Education, Berge Z.L. (ed), *Sustaining Distance Training: Integrating Learning Technologies into the Fabric of the Enterprise,* San Francisco: Jossey-Bass, 13-27.

De WOLF, H. C. (1994). Distance Education, Husen T. & Postlethwaite, T.N. (ed), *The International Encyclopaedia of Education,* Oxford: Pergamon. Second Edition, 3, 1557-1563.

HADDAD, W. D. & Jurich S. (2002). ICT for Education: Prerequisites and Constraints, Haddad, W.D & Draxler, A. *Technologies for Education: Potentials, Parameters, and Prospects.* Paris & Washington: UNESCO & Academy for Educational Development, 28-41.

HOLMES, D. R., Karmacharya, D. M. & Mayo, J. K. (1993). Radio Education in Nepal, Perraton, H. (eds*), Distance Education for Teacher Education*. London: Routledge, 136 – 195.

JUMA, M. (2001). From Traditional Distance Learning to Virtual Distance Learning in Higher Education in Africa: Trends and Challenges, Tschang, F.T. & Senta, T.D. (ed), *Access to Knowledge: New Information Technologies and the Emergence of the Virtual University,* Tokyo: United Nations University, Institute of Advanced Studies, 289 - 312.

MAKERERE UNIVERSITY, (February 2001). *Makerere University Information and Communication Technology: Policy and Master Plan.* Kampala: Makerere University.

McLOUGHLIN, C., & Oliver, R. (1999). Pedagogic Roles and Dynamics in Telematics Environments, Selinger, M. & Pearson, J. (ed), *Telematics in Education: Trends and Issues,* Amsterdam: Pergamon, 32 - 50.

MEYER-PEYTON, L. (2000). Elements of a Successful Distributed Learning Program, Lau, L. K. (ed), *Distance Learning Technologies: Issues, Trends and Opportunities.* Hersey & London: IDEA Group Publishing, 82 – 90.

MOORE, M. (1996). Theory of Transactional Distance, Keegan, D. (ed), *Theoretical Principles of Distance Education,* London: Routledge, 22-38.

MOORE, M. (Fall 1986). Self-Directed Learning and Distance Education, *Journal of Distance Education,* 1 (1), 7-24.

ORIVEI, F. (1994). Distance Education: Economic Evaluation, Husen, T. & Postlethwaite, T.N. (ed), *The International Encyclopaedia of Education*, Oxford: Pergamon. Second Edition, 3, 1567–1 573.

PAUL, R. S. (1990). *Open Learning and Open Management: Leadership and Integrity in Distance Education.* London: Kogan Page.

PETERS, O. (1996). Distance Education in Post Industrial Society, Keegan, D. (ed), *Theoretical Principles of Distance Education,* London: Routledge, 39-58.

PERRATON, H. & Creed, C. (2001). *Applying New Technologies and Cost Effective Delivery Systems in Basic Education.* (Thematic Studies for Education for All 2000 Assessment) Paris: UNESCO.

PERRATON, H., Creed, C. & Robinson, B. (2002). *Teacher Education Guidelines: Using Open and Distance Learning Technology - Curriculum - Cost - Evaluation.* Paris: UNESCO.

REPUBLIC OF UGANDA, (July 2002). *National Initiatives Concerning the ICT and Education/Training–Uganda.* The Republic of Uganda Ministry of Works, Housing and Communications The President's Office, National Council of Science and Technology. http://www.logos-net/ilo/150_base/en/topic_n/t8_uga.htm

THOMAS, J. (2001). *Using Community Radio for Non-Formal Education: Knowledge Series.* Vancouver: Commonwealth of Learning.

TOOTH, T. (2000). *The Use of Multi Media in Distance Education: Knowledge Series.* Vancouver: Commonwealth of Learning.

TSCHANG, F.T. (2001). Virtual Universities and Learning Environments: Characterizing their Emergence and Design, Tschang, F.T. & Senta, T.D. (eds), *Access to Knowledge: New Information Technologies and the Emergence of the Virtual University,* Tokyo: United Nations University, Institute of Advanced Studies, 17-51.

TSCHANG F. T., Senta T. D. (2001). Introduction, Tschang F.T. & Senta, T.D. (ed), *Access to Knowledge: New Information Technologies and the Emergence of the Virtual University,* Tokyo: United Nations University, Institute of Advanced Studies, 1-15.

UNITED NATIONS DEVELOPMENT PROGRAMME, (2003). *Human Development Report 2002,* New York: Oxford University Press.
http://hdr.undp.org/reports/global/2002/en/indicator.cfm?File=cty_f_UGA.html.