EMERGING TECHNOLOGIES: AN OVERVIEW OF PRACTICES IN DISTANCE EDUCATION

By

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ABSTRACT

In contemporary society, information and communication technologies (ICTs) are playing crucial role in dissemination of knowledge and information worldwide. Universities/ higher education institutions, particularly distance education universities in developed countries are making best use of these technologies for effective and interactive teaching learning process. Developing countries are also trying to adopt the model of developed countries according to their resources and circumstances.

Distance education universities in developed countries like United States of America and United Kingdom are using advanced technologies such as computers, Internet (World Wide Web), satellite communication, teleconferencing (videoconferencing and audio conferencing) and virtual reality in education and training.

In developing countries like India, Pakistan and Thailand, distance education universities are using Radio, Television and Internet for teaching learning purpose and students support services. Yet the usage of computers in educational institutions is comparatively low than official work. They are trying to adopt advanced technologies like developed countries but they have some limitations of resources (human & material resources). In future it is hoped that developing countries will also be using emerging technologies for teaching learning purpose.

Keywords: Open University, Distance Education, Emerging Technologies, Information and Communication Technologies

INTRODUCTION

The present age is the information age - a time when knowledge is considered as the real power. Information encompasses and relies on the use of newly sprung technologies for its universal access. Knowledge comes from having information (Haag, S., Cummings, M., &Dawkins, J.1998). Therefore, emerging technologies extend knowledge beyond the geographical boundaries of a state and/or country and can provide relevant information when required.

Emerging technologies are the result of knowledge explosion, where according to Marriam, S. B. and Cafarella, R.S. (1997, p.15) "computer technology (software) extends the mental ability." Therefore, emerging technologies may include computer and its related technologies of high tech and low touch nature. Hussain, I. (2005) stated that emerging technologies are used in education and training to improve the teaching learning process. These are "current technologies incorporated into the teaching learning environment {process}" (Rashid, M., 2001, pp.301-338). These include wireless communications, the information highway; asynchronous mode, integrated services digital networks (ISDN), multimedia applications, personal digital assistants (PDAs), artificial intelligence and virtual reality. These technologies would have the characteristics of big of brain and small of mass, depending upon capabilities of computer technology for their effectiveness and advanced applications.

Distance Education may be regarded as a teaching strategy with its distance learning approach. It is according to Kirschner, P. (1999, p.81) "mediated experience where the specific aim is the intentional acquisition of knowledge, attitudes and competencies". However, distance education has multi dimensional aspects. Bates A.W. (1995, p.11) discussed these aspects and pointed out that distance education is going through a shift "guided independent study to interactive or networked multimedia education and following a more flexible, interactive (constructivist) paradigm for learning

within learning communities". It is open, flexible and collaborative educational activity encompassing emerging technologies. This paradigm shift of distance education may be characterized as:

- competency-based education
- continuous assessment and evaluation based learning
- cooperative and collaborative learning
- flexible learning material
- internet-based study environment
- benefits of self instructional material
- self-directed study
- learning within learning communities
- group dynamic over the internet

Therefore, the availability of emerging technologies would reinforce this by offering on-line interactive learning environments, where the students would follow an individual as well as group-learning path to develop the desired competencies and skills.

Distance education, as an industrial form of education emphasizes on individual (self-directed) as well as group (collaborative) acquisition of knowledge, competencies and skills. Collaborative learning as a guided didactic principle has strongly affected the performance of the students, tutors, academicians and supporting staff (technical staff) working together. Such collaboration promotes opportunities of acquiring social skills and etiquettes.

Rashid, M. (1992, p.6) stated that using information and communication technologies, distance education embraces all individuals of the society, and takes place by two-way communication and interaction between the teacher and learner.

Therefore, distance education universities/institutions all over the world are exploring and making the best use of such emerging technologies such as advanced computer technology; Internet & World Wide Web (W W W), tele-conferencing, educational television and other computer related technologies to make the education more productive and individualized. Learner may interact with their fellows and tutors of learning communities independently and frequently.

Many distance education universities/institutions of the world are using these advanced technologies. Some experiences of different universities from developed and developing countries integrating the advanced technology are discussed in this article. This article also indicates the difference and gap between the developed and developing countries in adopting technology in education and will make the readers to think about bringing the gap.

2. United Kingdom (UK)

2.1 United Kingdom Open University (UKOU)

The Open University of the United Kingdom was found in 1969, and is a pioneer distance teaching institution at higher level in the world. The charter of the UKOU directs it to conduct teaching and research by using combination of appropriate media and technology in higher education. Therefore it offers various courses through technology based teaching system. Daniel, J.S. (1996, p.34) stated that through it is a knowledge Media Institute, UKOU is the British leader in research and development on the large-scale use of new technologies for education and training. It might have privileged access to certain communication facilities. According to Kirkwood, A. (1997, p.12): The United Kingdom Open University makes use of a range of media. These include specially written text materials, broadcast television and radio programs, audio and video cassettes, experiment kits and computer software.

For quality teaching, UKOU is using media that support one-way communication such as printed texts, television and CD-ROM. The Internet, World Wide Web and Teleconferencing at UKOU would make it possible for a range of two-way interactive educational activities to take place. These may facilitate not just the delivery of educational materials for distance learning but also increase the opportunities for intellectual interaction between students and teachers irrespective of their location.

Studying an Open University course (http://www.open

.ac.uk/) via the Internet provides students opportunities of communication with their tutors and fellows. Students can submit their assignments through e-mail and participate in electronic tutorials from their homes. This can make distance education more suitable particularly for those who live far away from Open University study centers in the UK, Ireland and continental Western Europe or whose employment or domestic situation make it difficult for them to attend tutorials at the study centers.

UKOU uses web to support its mission of accessible education. In 1994, it experimented with offering an e-course on advanced psychology, using World Wide Web and other Internet tools. Students regarded the opportunity necessary to continue their studies without interfering with their family commitments and employment. The project evaluators also found the level of contact and interaction among students and instructors very useful and is similar to regular classes. (http://www.keats.open.au.uk/zx).

Competence to use information and communication technologies is a statutory requirement for newly qualified teachers in UK. Davis, N. (1996, p.128) stated that the UKOU offered a distance pre-service teacher education course through tele-communication and computer conferencing in 1994. It also had a database assignment with an on-line element. Communication took place among students across the UK in such a large quantity and it was difficult to read each message. Local tutors' groups also considered those conferences as a valuable entry point and a distance seminar. Assessment on this medium was tried out and found to be successful and effective.

Davis, N. (1996, pp.126-128) described that following services are available in the United Kingdom to incorporate ICTs in education and training:

2.1.1 Satellite and Terrestrial Telecommunications

The UK has access to satellite television. The Wales has a high proportion of schools with satellite receiving dishes. There is a range of computerized services available through telephone lines throughout the UK. The services available to education in the UK are either networked services with one or more host computers or services used between two points.

2.1.2 Networked Services

For education, Campus 2000 system is available anywhere in the UK. Campus 2000 provides Central Telecom - Gold electronic mail, some database and computer conferencing. There are also a few local systems available within a region.

For higher education and research the Joint Academic Network (JANET) provides national electronic links between universities, and gateways to other services including networks. For this purpose a wider band network, Super JANET is being installed.

2.1.3 Point-to-Point Communication

Point to point electronic communication is also available. Any individual or institution can make their computer available to external users by attaching a modem. Integrated Services Digital Network (ISDN) is coming into service for point-to-point error free communication. They can carry both voice and video relatively easily for any sector of education.

In 1995, Crystallography Department of College of the University of London, England (http://csssrvr/entnem.edu) offered a 15-week course "the Principles of Protein Structure" on the Internet. The course consisted on web based interactive graphical learning modules developed by experts. The course activities were supported by on-line discussions with other students and course consultants. Some 250 students throughout the world participated in the course. Students and course consultants were split into study groups of 15-20 individuals. Evaluations of the course were extremely positive as students commented that they could study at their own convenience, have easy access to course resources and contact with a large number of scientists easily and informally.

3. United States of America

3.1 National Technological University

National Technological University (NTU) and the Mind Extension University (MEU) rely heavily on satellite TV to distribute their courses. @NTU was founded in 1984 and it

offers a wide range of advanced science and engineering courses using live, satellite-based narrow cast instructional TV, sometimes backed by e-mail. About 45 technical universities in North America uplink to NTU's transponder using compressed digital TV and there are downlinks in these same universities as well as some 500 sites in high-tech companies and governmental agencies. Both degree courses and continuing education seminars are offered here. NTU is projected to be fully global by the year 2000. MEU employs a similar concept based on satellite and cable TV, focusing mainly on technical and business courses, some of which permit interaction with the instructor and the students by telephone and/or e-mail.

Similarly, in USA and Europe, Nursing Education is imparted through distance education. University of Northumbria (UNN) England and North Georgia College and State University (NGCSU) in USA started a collaborative project of Nursing Education, using desktop video conferencing (DVT). The project was of eight weeks duration. It was designed to investigate the Women's Family Central Healthcare Systems in both (England and USA) the countries. The student's attitude towards the project and faculty educators suggested such project to be envisaged in future. (Sumners, A. 2000 http://www.westga.edu/tronsgord.24.html)

Likewise, the example of Alaska School District, where in the North Slope Borough School District (NSBSD) of Alaska, students watch TV for academic credit. Many of the Borough's village schools have fewer than 100 students (pre-school to high school). The smallest village school has only 42 students and 6 staff members. The largest has 221 students and 21 staff members. Because of the vast distance, until 1992, providing comprehensive education for the Borough students was difficult. But just before the 1992-93 school year, the district implemented a video-conferencing programme called "Distance Education Delivery" (Baber, M & Meyer, M., 1998).

The Rochester Institute of Technology uses a wide variety of technologies to offer both graduate and undergraduate degrees in applied computing telecommunications, health administration, and environmental management. Extensively developed distance-learning courses reach students in sixteen States, incorporating a mix of media, including print, videotape, audio-conferencing, audio-graphic, computer networking, and tutorial software.

According to Baber, M. et al (1998, pp.1-6) Maryland's College of the Air offers ten tele - courses per semester via the Maryland Center for Public Broadcasting to approximately, 10,000 students registered through one of the twenty - one community colleges in the State, since its inception eight years ago. The College of the Air has delivered courses to 85,000 students in four States. The University of Maryland System operates a compressed video network linking nine locations throughout the State. The system combines voice, video and data and instructional, administrative and library reference purposes. The University of Maryland's, University College campus also offers live, interactive computer-assisted course to several sites in the State.

Massachusetts Corporation of Educational Telecommunications at Boston operates a satellite broadcast network dedicated to improve the quality of school education. Over 225 school systems in Massachusetts and dozens of school district in 17 other states receive programmes on science, mathematics, arts, music, language and foreign culture.

4. India

4.1 Indira Gandhi National Open University (IGNOU)

Indira Gandhi National Open University (IGNOU) is the main distance education institution in India. IGNOU (1995) started the use of TV and other technologies in education. IGNOU uses various media/channels of communications for effective distance education programmes. These media range from printed material to the latest video conferencing technology.

According to IGNOU (1995, pp.5-12) Radio entered in education in the decade of 70s with its broadcasts supplementing the lesson unit. The Madurai Kamaraj University in Tamilnadu was the pioneer in utilizing this facility. Today, similar support is extended by radio to the correspondence courses of the Delhi University, the

Punjabi University, the Andhra Pradesh Open University and Madurai Kamaraj University. In 1992 Radio and TV channels started broadcasting programmes of the Indira Gandhi National Gandhi Open University in a limited way.

4.1.1 Television in Education

In mid-70's with use of a US satellite a year long project 'SITE' (Satellite Instructional Television Experiment) was launched to beam instructional programmes in agriculture, health, family welfare, science and education in 4 languages for 4 hours daily to 2400 villages in 6 States.

Based on the evaluation of the SITE experiment, which was a notable success, India embarked on expanding the TV network using its own satellite. Telecast of higher education began in 1984 with University Grants Commission's (UGC) Countrywide Classroom. The programme primarily targeted at rural and suburban undergraduate students and is put out for a duration of 1 hour, six days a week.

Subjects covered include physical & biological sciences and art & humanities. Feedback shows a good response to these programmes. In 1982, television support was extended to the assistance education programmes of the IGNOU. These are telecasted on alternative days as an half an hour program.

The Indira Gandhi National Open University started experimenting with delivery of instructions through one-way video and two-way video teleconference in 1993 in collaboration with the Indian Space Research Organization (ISRO). Since 1985, IGNOU and various other agencies and State Governments are regularly using the system for tele counselling and tele-training. According to Ram, R. and Khan, (1998, pp.27-34) at present receiving centers have been set up at 17 Regional Centers and around 120 study centers of IGNOU. Apart from IGNOU, approximately 250 modes are available at many user organizations, which are regularly using the system. School of Education also uses teleconferencing for Extended Contact Programme in the Postgraduate Diploma in Higher Education.

5. Pakistan

In Pakistan two universities in the public sector impart distance education they are:

1. Virtual University of Pakistan, Lahore
2. Allama Iqbal Open University Islamabad

5.1. Virtual University of Pakistan

The aim of Virtual University of Pakistan is to extend affordable quality higher education to every individuals in all areas of Pakistan. Virtual university delivers education through television and the Internet. It offers professional development courses as part of its contribution to continuing education. According to Virtual University of Pakistan (2004, pp.07-09). The virtual university has established its own virtual campuses in all its four provinces as well as Islamabad. The virtual campuses are equipped with state-off-the-art multimedia projectors and screens, multimedia equipped with personal computers in a LAN configuration. The LANs are interfaced to Internet, to allow virtual university students to gain immediate access to the online environment. Video-equipment to receive television broadcast to display via multimedia projector is also provided.

Virtual university students attend lectures in electronic classrooms at its Private Virtual Campuses (PVCs). The formal classroom environment allows students to participate in group discussion and enjoy a campus like atmosphere, which may overcome the isolation. Virtual campuses also provide adult mentoring and guidance facilities.

The prospectus (2004) further states that recorded lectures, after insertion of studies, memories chips and other materials are broadcasted over television and are made available in the form of multimedia series, video tapes as well as screening media from the Virtual University server. The contents are also provided through a comprehensive learning management system hosted a Virtual University Web Server and accessible over the Internet. The Learning Management System (LMS) also provides an e-mail facility to every students as well as discussion boards for insertion within the virtual university community.

Virtual University faculty monitors the process continuously and answers to students' questions within short time interval. Assignments are handed out through the LMS and also submitted by the students through the same procedure. Practical tests are also conducted through the LMS. With launching its own two television channels, Virtual University conducts nation wide tutorial sessions.

5.2. Allama Iqbal Open University

In Pakistan, distance education started with the establishment of Allama Iqbal Open University in 1974. AIOU is the pioneer distance teaching institution in the Asian Region. At present, it offers 100 programmes and 1000 courses with one million students' enrolment in various courses, besides a centrally controlled system spread all over the country having 32 regional centres and 60 terminals (AIOU 2003, p.13).

AIOU has effectively used the print, sound and pictures for its delivery system. The radio and television programmes produced at the Institute of Educational Technology (IET) promote and support the distance teaching based courses of the university. The material produced is transmitted through the national broadcasting network and non-broadcasting media to be used for small group instruction and individual study. The media support, which supplements the university course material, also has a significant educational value and public concern. The educational television is using satellite for beaming its programmes. According to AIOU news (1999, p.22), "240 courses have media support. The support at present is in the form of 441 TV programmes, 2345 radio programmes, and 279 audio non broadcast-video programmes". However, the use of emerging technologies at AIOU is in its earlier stages and university intends to benefit the potential of these technologies.

The Vice-Chancellor (AIOU, 2002, p.5) stated that university wanted to go online. The government has also encouraged them to launch their programmes online. Vice Chancellor further explained the situation as, "in our education system we have to reach to the remote areas of the country and that is only possible through satellite, now there are plans that the government will have access to some commercial satellites for the education purpose and we will certainly benefit from this. We ourselves are trying to obtain the license for the radio and television channels".

AIOU uses computers for different official works. Academic use of computers is too limited to describe except French online.

The use of emerging technologies at AIOU, in the Annual Report (1999-2000, pp.114-116) described the use of different technologies. Due to computerized procedures, AIOU is now able to enroll thousands of students, mail the study materials, conduct exams and tabulate the results within a limited period of six months. Presently, computer centre is facilitating the university in the following areas:

- Student Admission and Registration
- Fee collection record
- Mailing of course materials
- Conducting examinations
- Tabulation of results
- Staff Payroll
- Research/Statistical Data
- Assess student progress
- Tutor student allocation system
- Networking (LAN & WAN).
- Internet and E-mail
- Exchange of data between campuses/regions through FTP
- On-line student enquiry system
- Computerized certificates/degrees.

HAIOU always wanted to update its system in terms of content, delivery, student support services and examination. According AIOU News (AIOU, 2001, p.10), "AIOU wants to update its education system by adopting the Internet, satellite and teleconferencing system. To achieve the objectives, university is not only computerizing its central and regional libraries but also thinking of setting up electronic libraries". At present, Department of Computer Science offers PGD, BCS and MCS programmes. Therefore, the time is no far when AIOU

would be using emerging technologies effectively.

5.2.1 Collaboration with Other Institutions

AIOU has signed a Memorandum of Understanding (MOU) with the University of Lahore to start online education. According to the MOU, the various AIOU programmes will go online by using the University of Lahore's CISCO laboratory infrastructure (AIOU, 2001, p.7).

For AIOU to meet the requirements for the use of new technologies, a paradigm shift was warranted. This paradigm shift called for,

- digitizing the existing courses
- developing new courses in emerging disciplines for degree programmes and;
- offering training courses for international certification which are much in demand, and ensure high rates of economic return. For AIOU, this required the establishment of extensive infrastructure of networking and multicasting across the country, the setting up of Internet Service Provider (ISPs) using technology which may ensure downloading of courses along a wide bandwidth, developing high technology laboratory which could be used as "virtual laboratories", conducting examinations through its own centers distributed over the country and supporting this system through a high class effective and efficient software (AIOU 2003).

This might call for very high costs and highly qualified faculty which might be difficult for a single institution to provide and the AIOU had insufficient IT resources to manage education networks and to provide vital technology support and resources for operation of virtual classroom. Therefore, for this, AIOU decided to work through a consortium. AIOU has agreed to start e-education with private/public partnership and collaborated with the University of Lahore in the advancement of education through Virtual Education Model. The programme integrates, a web based uniform standard course material delivery, internet based clientele, frequent on-line usage and online tutors guidance, with provision of management tools providing built-in accountability, student performance tracking and providing feedback to students, tutors and administration with assurance of quality of education (AIOU, 2001, p.7).

Conclusion

From the above discussion it can be concluded that developed countries (UK and USA) are using more advanced information and communication (emerging) technologies to enhance the teaching learning process particularly through distance education. They are using Internet, teleconferencing and satellite communication along with computer technology for improving the teaching learning process. In developing countries distance education universities are using mostly Radio and Television for imparting instruction. Use of Internet for teaching learning purpose and students support services is only in the developing stage. They are using computers mostly for office work database. However, they are trying to adopt advanced technologies in education to yield a fruitful result of technology - rich - curriculum.

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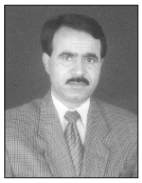

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