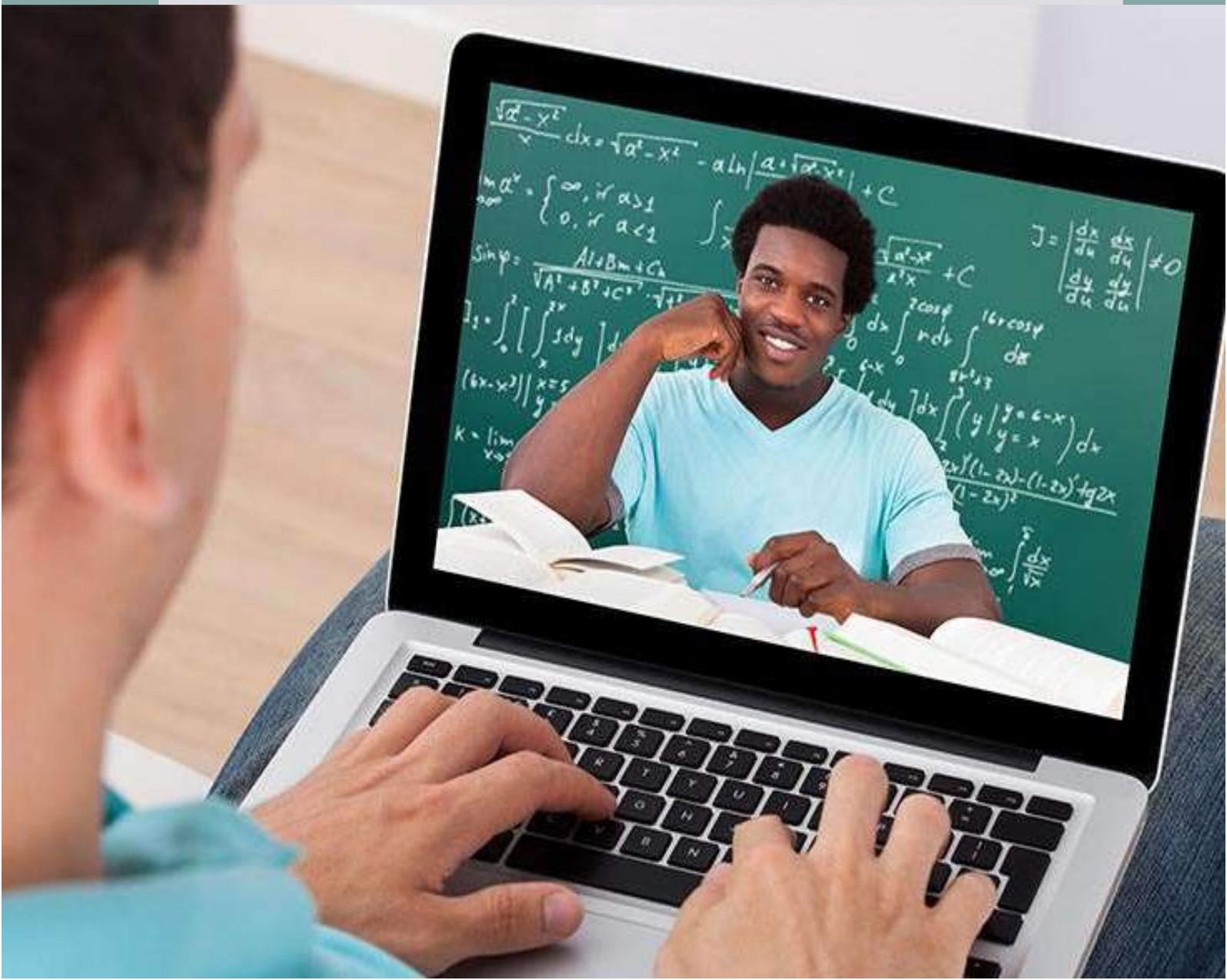# DISTANCE EDUCATION
THEORY AND PRACTICE

Dr. Babita Sharma

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Contents

Preface

Distance education theory and practice encompass a wide array of principles and methodologies aimed at delivering educational content to learners who are geographically separated from instructors or educational institutions. At its core, distance education seeks to bridge the gap between learners and educational resources through various forms of technology and instructional design. The theoretical framework of distance education draws from constructivist, cognitive, and socio-cultural perspectives, emphasizing learner-centered approaches and the active engagement of students in their own learning process.

One key aspect of distance education theory is the concept of learner autonomy, wherein students take responsibility for their learning and progress independently. This necessitates the design of flexible, self-paced learning environments that accommodate diverse learner needs and preferences. Additionally, distance education theory emphasizes the importance of learner interaction and collaboration, facilitated through online discussion forums, virtual classrooms, and group projects.

The practice of distance education involves the integration of various instructional technologies and media to facilitate effective teaching and learning at a distance. This includes the use of multimedia resources, interactive simulations, and online assessments to engage learners and enhance comprehension. Moreover, distance education practitioners employ pedagogical strategies such as scaffolding, feedback mechanisms, and differentiated instruction to support learners' academic progress and achievement.

Furthermore, the design and implementation of distance education programmes require careful consideration of factors such as learner readiness, access to

technology, and cultural diversity. Educators must employ inclusive teaching practices and accommodate diverse learning styles to ensure equitable educational opportunities for all students. Additionally, ongoing assessment and evaluation are essential to monitor learners' progress and the effectiveness of instructional strategies, allowing for continuous improvement and refinement of distance education practices.

Distance education theory and practice also address challenges related to learner motivation, retention, and satisfaction in online learning environments. Strategies for promoting learner engagement and persistence include fostering a sense of community among students, providing timely support and guidance, and offering opportunities for active participation and meaningful interaction with course content.

Ultimately, distance education theory and practice strive to democratize access to education, breaking down barriers of time, space, and resources to make learning opportunities more accessible and inclusive for learners worldwide. By harnessing the potential of technology and innovative instructional design, distance education opens new avenues for lifelong learning and professional development, empowering individuals to pursue their educational goals regardless of geographical constraints.

The book also addresses issues related to learner support, including advising, tutoring, and assessment, to enhance student retention and success in distance learning environments.

–Author

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An Introduction to Distance Education

This introduction is taken from a publication titled "Distance Learning: An Introduction" and was a collaborative effort of the Indiana University Centre for Excellence in Education and the AT&T Centre for Excellence in Distance Learning.

In today's Information Age, learning is no longer confined within the four walls of a classroom. The instructor, armed with a textbook, is no longer the sole source of educational experience. Information resources are everywhere, often separated from the learner by time and space. Distance learning defines the process of connecting learners with these remote resources.

Learning is a lifelong pursuit where training and retraining become strategies for both individual and corporate success. Distance learning uses communications technologies to harness the vast array of resources available and stimulate the development of lifelong learning skills. A variety of technologies are used for distance learning, including video, audio, computer, audiographics, and print.

There are a variety of distance learning solutions for every educational need. Distance learning applications should begin with a clear understanding of the learner, as well as the educational needs and objectives of the organization. Technology options can then be considered that best address those understandings. A comprehensive distance learning solution will often be a combination of technology options, creating a set of learning tools that meet the needs of both the instructor and the learner.

As an introduction to the technology, let's explore some needs and objectives of several segments of our society that are including distance learning solutions in their strategies for today and the future. If there is one constant in today's

business environment it is the constant of change. US Department of Labour statistics published in the book Workforce 2000, show that the workforce is becoming older, less advantaged, and less literate. As we all know, our economy is also shifting from a manufacturing base to a service base. At the same time, companies are becoming more global and more diversified.

If business and industry are to compete, survive, and prosper in today's highly competitive global environment, continuous training and retraining is critical. The concepts of lifelong learning and just-in-time knowledge are important business strategies. One key to success is the application of cost effective and continuous means of distributing that training.

Some common training/retraining needs that are being addressed by distance learning applications include:
- New product and policy information
- Job skills training/retraining
- Advanced professional education
- Management development courses
- Customer education.

America's colleges and universities are facing many challenges today. Seventy five percent of the workforce will need retraining in the next ten years. Employers in this country spend billions of dollars every year on formal educational opportunities. At the same time, universities are facing shrinking institutional budgets.

Traditional universities must develop new ways to distribute their basic product-education-to nontraditional learner populations. These new learners will speak multiple languages, will live all over the world, and will be reached on remote campuses, in government and business workplaces, and directly in their own homes.

Some of the programmes that are being delivered by universities via distance learning include:
- Undergraduate/graduate courses
- Degree programmes
- Continuing education
- Staff development/in-service training.

Our public education system was designed to meet the needs of the Industrial Age and is now attempting to meet the needs of the Information Age. Learning resources are no longer concentrated solely in the schools, but are available from sources worldwide. The content of learning-information-is everywhere and the challenge for schools is to develop the tools for access to this information and the development of lifelong learning skills.

Distance learning applications are being used in elementary and secondary education to improve access to instruction and educational resources. The technologies serve as the critical connection between the school and the outside world. Distance learning technology links learners at multiple sites and valuable faculty resources are shared to provide learning opportunities that would not otherwise be available.

Some of the distance learning applications being implemented in the K-12 environment include:

- Advance Placement high school courses
- Curriculum enrichment programmes
- Virtual field trips
- Staff development
- Adult Education.

When planning and implementing distance learning systems, understanding the technologies involved is important. These technologies are organized into three areas: telephones, computers, and video. Before beginning a discussion of these technologies, several concepts will be helpful.

Convergence: While the telephone, computer, and video industries have traditionally been separate, today's changing technological arena is blurring these distinctions. The common denominator is information in a digital format, making it possible for telephone networks to deliver video and data services and cable companies to offer telephone service. Computers are coming to market that will handle all of these applications.

Interaction: The level of interaction between instructors and learners in distance learning systems varies. Correspondence courses provide one level of interaction, satellite programmes another, and interactive television yet another. Interaction does not always need to be a real-time communication. Good examples of non-real-time interaction include voice mail and computer email.

Distance Learning Systems: A comprehensive distance learning system will include a combination of technologies. For example, in a distance learning system that uses interactive video as the primary method of delivery, voice mail, electronic mail and fax technologies might be employed for additional interaction between learners and faculty and to provide support services for the distance learning system.

Multipoint: As the name implies, a point to point connection involves interaction between two locations; and a multipoint connection involves three or more locations simultaneously. These terms are used to describe all types of conferencing: voice, data, and video.

Bridging: Multipoint connections are created using a bridge in audio systems or a Multipoint Control Unit (MCU) in video systems. Commercial multipoint services are available or multipoint technology can be installed as part of the distance learning system.

Analog vs. Digital: Today's distance learning technology is a mix of analog and digital technology. These terms refer to the characteristics of representing information in electronic form. Analog is a continuous waveform representation that varies by time and intensity, whereas digital representation codes everything into a binary language of ones and zeros. Voice and video technologies have traditionally been analog. Computer technology is digital. The convergence of these media will eventually lead to all digital technology. Telecommunication systems are still a mixture of analog and digital signalling, but will continue to upgrade to all digital facilities. The challenge is to best leverage what exists today within the vision of the digital future.

Telephone Technology: One of the simplest, most cost effective distance learning technologies available is the telephone. With user friendly equipment, you can access distance learning experiences, interact with experts, receive information updates, and share ideas with almost anyone, anywhere. The telephone often serves as the audio component of other distance learning systems such as audiographics, and desktop videoconferencing.

The audio component of a distance learning system can be as simple as a telephone and as complex as a system of microphones, cabling, audio mixers, and echo cancelling equipment. Audio is among the most critical components of a system to ensure effective interactive communication. (Try turning the sound down on your television and follow what's going on. Contrast that to turning off the picture and listening to the sound only.)

Audio Conferencing: The devices used for audio conferencing range from individual telephones and speakerphones to specially designed room systems that include speakers, microphones, and equipment to mix the sound. Audio conferences can be used for a variety of applications including meetings, the delivery of courses and training, and for guest lectures in any kind of classroom.

Callback Devices: One-way video systems like satellite delivered programmes can be combined with telephones to allow learners at remote sites to call into the originating location to interact with instructors and other learners.

Voice Mail: This application can provide an effective vehicle for learner/instructor conferences, parent/teacher communication, and the "homework hotline."

Fax: Another easy, effective way to send information from one classroom to another is by using fax machines.

Finally the telephone can serve as a valuable backup device in other distance learning environments. When necessary, the telephone can help troubleshoot problems and provide an audio fallback for instruction.

Personal computer technology is becoming an important, integrated element for distance learning. Some powerful applications for computer technology include communication, search and retrieval of information resources from a global network environment such as the Internet, and access to collaborative learning environments.

The technology of computer based distance learning starts with the desktop computer, and can include a variety of peripheral devices and communications tools. Connectivity to networks is provided by either a modem and telephone line or a direct connection to high speed data networks. The computer may serve as the primary distance learning platform, as in Computer Based Training, or as a support system in other distance learning environments. A good example of the latter is the use of email for communication between learners and instructors.

Some applications that use the personal computer platform for distance learning are:

Computer Based Training: The electronic version of the correspondence course, CBT is typically self-paced instruction that learners access from desktop computers. The training materials might be installed on the local computer, CD-ROM, Laserdisk, or accessed from a computer network.

Electronic Mail: Electronic mail allows learners and instructors to communicate across time and distance using typed messages sent over both local and global networks.

On-Line Classes: This term refers to courses where lectures, readings, and assignments are posted on computer bulletin boards and learners access and download the course materials. Other applications such as email are used for private communication between learners and instructors.

Computer Conferencing: Interactive computer based communication environments can be real time "chat" modes where participants converse by typing on the keyboard or modes where communications are posted to electronic discussion groups called bulletin boards.

Groupware: This is the term used to describe some emerging applications that allow an electronic work space for collaborative work, sharing of ideas, and group process. Starting with the conferencing concept above, groupware is able to store, sort, and organize the inputs of participants and to support group processes such as idea generation, evaluation and consensus building.

The combination of the telephone and the computer creates a distance learning application called audiographics. In this environment the telephone is used for voice interaction and the computer is used for sharing graphic materials and collaborative work. Participants can interact with visual presentations and audio conference at the same time. Applications using audiographics can range from one time training exercises to semester long academic course work.

Each site is equipped with speakerphone, computer and software, modem, and optional peripheral devices like mouse, graphics tablet, scanner and camera.

Class sessions are set up using the switched telephone network (standard telephone lines). Some audiographics systems combine the voice and computer signals on a single phone line. Other systems use two phone lines, one for voice and one for the computer. Connections can be either point to point or bridged into multipoint sessions.

Video Technology: The ability for instructors and students to see and hear one another brings new levels of interaction to the distance learning experience. Collaborative problem solving, demonstration, behaviour modelling, and skills practice are all enhanced by the addition of video. Distance learning applications using video technology fall into two general categories, one-way broadcast and two-way interactive.

One-Way Video: The distinguishing characteristic with this distance learning application is that video signals are transmitted in one direction, from the instructor to the learners. The most common method of delivering the broadcast is by satellite. Components of a satellite broadcast systems include: The production facility for programme origination, the satellite uplink for transmission of the programme to a satellite orbiting the earth, the satellite transponder that receives the earth signal and retransmits that signal back to earth, satellite downlink equipment, and finally a site for people to view the programme on standard television monitors. The programme that originates

from one site is transmitted by satellite to a "footprint" that covers a very wide area. For example, satellite programmes in this part of the world can be received simultaneously by multiple sites anywhere in the United States. Communications from the receiving sites back to the originating studio is accomplished using telephones, so learners can interact with the instructor.

Two-Way Video: Another distance learning system provides video and audio communications in both directions between learners and instructors. This is referred to as interactive video. All locations in an interactive video system are equipped with cameras, monitors, and microphones. Point to point and multipoint connections link learning sites and instructors and learners can see and hear each other.

These connections use communications circuits that can deliver either full motion video or compressed video services. In both systems, the learning site is equipped with cameras and microphones.

A full motion, interactive video distance learning system is one that provides picture quality that is comparable, or close to, the quality of commercial television. These systems typically use fibre optic cables and high capacity circuits to network learning sites together. High capacity networks are often built with private, dedicated circuits between locations in a distance learning system.

Compressed Video: These systems offer a different variety of bandwidth services to the user. The audio and video signals go through digital signal processing that reduces the amount of information that is sent from location to location. These compressed signals can be sent over the switched telephone network. Using digital telephone services, the quality of the picture is a function of how many circuits used. This can range from as few as two (112 Kbps) to as many as twenty four (1.5 Mbps). The cost for the connection is based on the bandwidth used.

The selection of full motion or compressed systems is influenced by learning requirements and cost factors. The technology is changing rapidly, and the trend is towards better quality video and audio on less expensive transport services.

As mentioned earlier, a comprehensive approach to distance learning applications will consider all of the technology options and build systems that include many of the technologies mentioned. A variety of combinations are in use today-an example might be an interactive, compressed video system that uses FAX and computer email for additional interaction.

IS DISTANCE EDUCATION EFFECTIVE?

Many educators ask if distant students learn as much as students receiving traditional face-to-face instruction. Research comparing distance education to traditional face-to-face instruction indicates that teaching and studying at a distance can be as effective as traditional instruction, when the method and technologies used are appropriate to the instructional tasks, there is student-to-student interaction, and when there is timely teacher-to-student feedback.

HOW IS DISTANCE EDUCATION DELIVERED?

A wide range of technological options are available to the distance educator. They fall into four major categories:

Voice -Instructional audio tools include the interactive technologies of telephone, audio conferencing, and short-wave radio. Passive (*i.e.*, one-way) audio tools include tapes and radio.

Video -Instructional video tools include still images such as slides, pre-produced moving images (*e.g.*, film, videotape), and real-time moving images combined with audio conferencing (one-way or two-way video with two-way audio).

Data -Computers send and receive information electronically. For this reason, the term "data" is used to describe this broad category of instructional tools.

Computer applications for distance education are varied and include:

- Computer-assisted instruction (CAI)-uses the computer as a self-contained teaching machine to present individual lessons.
- Computer-managed instruction (CMI)-uses the computer to organize instruction and track student records and progress. The instruction itself need not be delivered via a computer, although CAI is often combined with CMI.
- Computer-mediated education (CME)-describes computer applications that facilitate the delivery of instruction. Examples include
- electronic mail, fax, real-time computer conferencing, and World-Wide Web applications.

Print -is a foundational element of distance education programmes and the basis from which all other delivery systems have evolved. Various print formats are available including: textbooks, study guides, workbooks, course syllabi, and case studies.

WHICH TECHNOLOGY IS BEST?

Although technology plays a key role in the delivery of distance education, educators must remain focused on instructional outcomes, not the technology of delivery. The key to effective distance education is focusing on the needs of the learners, the requirements of the content, and the constraints faced by the teacher, before selecting a delivery system. Typically, this systematic approach will result in a mix of media, each serving a specific purpose. For example:

- A strong print component can provide much of the basic instructional content in the form of a course text, as well as readings, the syllabus, and day-to-day schedule.
- Interactive audio or video conferencing can provide real time face-to-face (or voice-to-voice) interaction. This is also an excellent and cost-effective way to incorporate guest speakers and content experts.
- Computer conferencing or electronic mail can be used to send messages, assignment feedback, and other targeted communication to one or more class members. It can also be used to increase interaction among students.

- Pre-recorded video tapes can be used to present class lectures and visually oriented content.
- Fax can be used to distribute assignments, last minute announcements, to receive student assignments, and to provide timely feedback.

Using this integrated approach, the educator's task is to carefully select among the technological options. The goal is to build a mix of instructional media, meeting the needs of the learner in a manner that is instructionally effective and economically prudent.

HISTORY OF DISTANCE EDUCATION

Distance education is not a new concept. In the late 1800s, at the University of Chicago, the first major correspondence programme in the United States was established in which the teacher and learner were at different locations. Before that time, particularly in preindustrial Europe, education had been available primarily to males in higher levels of society. The most effective form of instruction in those days was to bring students together in one place and one time to learn from one of the masters. That form of traditional educational remains the dominant model of learning today. The early efforts of educators like William Rainey Harper in 1890 to establish alternatives were laughed at. Correspondence study, which was designed to provide educational opportunities for those who were not among the elite and who could not afford full-time residence at an educational institution, was looked down on as inferior education. Many educators regarded correspondence courses as simply business operations. Correspondence education offended the elitist and extremely undemocratic educational system that characterized the early years in this country. Indeed, many correspondence courses were viewed as simply poor excuses for the real thing. However, the need to provide equal access to educational opportunities has always been part of our democratic ideals, so correspondence study took a new turn.

As radio developed during the First World War and television in the 1950s, instruction outside of the traditional classroom had suddenly found new delivery systems. There are many examples of how early radio and television were used in schools to deliver instruction at a distance. Wisconsin's School of the Air was an early effort, in the 1920s, to affirm that the boundaries of the school were the boundaries of the state. More recently, audio and computer teleconferencing have influenced the delivery of instruction in public schools, higher education, the military, business, and industry. Following the establishment of the Open University in Britain in 1970, and Charles Wedemeyer's innovative uses of media in 1986 at the University of Wisconsin, correspondence study began to use developing technologies to provide more effective distance education.

THE BACKGROUND OF EARLY DISTANCE EDUCATION

While it was-and is-perfectly possible to learn in study groups and by private reading in one's spare time, the need for systematic study alongside paid work

could only partly be met in these ways. For many study was-and is-possible only if it does not interfere with jobs by means of which adult students support themselves and their families. Only in thickly populated areas is it possible to organise study groups in the subjects required for university entrance, degree studies, professional qualifications or special training needs arising in industry and commerce.

Education and training became important social concerns in the latter half of the nineteenth century. This-combined on the one hand with liberal thinking concerned with the development of students' personalities, on the other hand with the necessities of livelihood-constitutes the background for the introduction of distance education at that time. It was the need for study alongside paid work and for individual learning as opposed to classroom learning that was the great instigating force. While presumably quite a few adults preferred individual study, this was in a great many cases the only learning opportunity open to would-be students.

The only media available to distance education during the pioneering period and until the second half of the twentieth century were print, the written word and phonograph recordings. What emerged was what is today regarded as traditional correspondence education. It seems worth stressing, however, that the two basic constituent elements of today's distance education, *i.e.*, mediated subject-matter presentation and mediated student-tutor interaction, were the vital characteristics also of the very early actions to bring about education in situations when students and tutors do not meet.

THE PIONEERS

Evidently, the needs referred to have occurred at other times in history than in the period indicated. People have studied in their spare time much earlier. There is even an indication that distance education may have been provided as early as 1728. In The Boston Gazette of 20 March, 1728, 'Caleb Phillipps, Teacher of the New Method of Short Hand' advertises that any 'Persons in the Country desirous to Learn this Art, may by having the several Lessons sent weekly to them, be as perfectly instructed as those that live in Boston' (Battenberg 1971, p.44).

A hundred years later we find more conclusive evidence of distance education in our sense. An advertisement in English in 'Lunds Weckoblad', No.30, 1833, a weekly published in the old Swedish university city of Lund, offers Ladies and Gentlemen' an opportunity to study 'Composition through the medium of the Post' (Baath 1980. p. 13 and Baath 1985, p.62). Another early attempt to organise distance education was made in England by Isaac Pitman who reduced the main principles of his shorthand system to fit into postcards. He sent these to students, who were invited to transcribe into shorthand short passages of the Bible and send the transcription to him for correction. This teaching of shorthand combined with a study of the Scriptures began in the year 1840 when in the United Kingdom the uniform penny postage was introduced. In 1843 the

Phonographic Correspondence Society was formed to take over these corrections of shorthand exercises. It was the beginning of what was later to become Sir Isaac Pitman Correspondence Colleges.

According to early tradition, organised distance education is assumed to have been introduced in Germany in the year 1856 by the Frenchman Charles Toussaint and the German Gustav Langenscheidt, who formed and organised a school in Berlin for language teaching by correspondence (Noffsinger 1926, p.4). What scope the correspondence actually had is uncertain; students were offered opportunities to submit questions, but, Baath writes, translating from the Toussaint-Langenscheidt prospectus, 'they were by no means encouraged to do so-"it would hardly be necessary", the prospectus said, "since everything is fully explained in the course". A pioneer of some interest is mentioned by Mathieson as a representative of the 'proto-correspondence study programmes' that existed in the United States between 1865 and 1890:

'The "mother" of American correspondence study was Anna Eliot Ticknor, daughter of a Harvard University professor, who founded and ran the Boston-based Society to Encourage Study at Home from 1873 until her death in 1897. The idea of exchanging letters between teacher and student originated with her and monthly correspondence with guided readings and frequent tests formed a vital part of the organization's personalized instruction. Although the curriculum reflected the "classical orientation", it is interesting that most of her students were women, a clientele then only beginning to demand access to higher education.' (Mathieson 1971, p.l.)

About the same time distance education was introduced in Japan. In an advertisement published in 1898 it was claimed that 'the method of correspondence education' had been 'invented' in Japan in 1882, which seems actualy to have been the year when a form of distance education was first applied in Japan (Hisano 1989, p.7 1).

At the end of the nineteenth century distance education was above all applied on the one hand to university and pre-university study, on the other hand to occupational training. The university extension movement promoted the use of distance education.

Among British pioneering organisations were Skerry's College, Edinburgh, founded in 1878 (preparing candidates for Civil Service Examinations), Foulks Lynch Correspondence Tuition Service, London, 1884 (specialising in accountancy), University Correspondence College, Cambridge, founded in 1887 and preparing students for University of London external degrees, and the Diploma Correspondence College, now called Wolsey Hall, Oxford, founded in 1894, preparing students for university qualifications but also offering a wide range of courses on other subjects.

In the USA Illinois Wesleyan College, founded in 1874, the Correspondence University in Ithaca, N.Y., 1883, and the university extension department of Chicago University, 1890, were amongst the pioneers (Mathiesen 1971, p.3). It can be mentioned that William Harper of Chicago, who has been called the

father of American distance education, offered instruction in Hebrew by mail in the 1880s. The early use of distance-education methods in occupational training can be illustrated by an attempt to teach mining and methods of preventing mine accidents which was introduced by a course in 1891 constituting a systematised continuation of an instructional activity begun earlier in a question column in the Mining Herald, a daily newspaper published in the coal mining district of eastern Pennsylvania. The initiator of the correspondence course was the editor of this newspaper, Thomas J. Foster. His initiative met with great success, and the response his course won led to the production of first an extended course of the same type and then to the preparation of a number of correspondence courses in various fields (Correspondence Instruction 1901). In fact, this was the beginning of the International Correspondence Schools (ICS) in Scranton, Pennsylvania, and their subsidiaries and offshoots.

Later developments show that the provision of both academic and practical occupational study opportunities was to be typical of distance education in the 20th century. Another pioneer illustrating this is Hermods in Sweden, founded in 1898 and later to become one of the world's largest and most influential distance-teaching organisations.

TWENTIETH-CENTURY DEVELOPMENTS

From these beginnings until around 1970 a steady expansion of distance education occurred without any radical changes but with gradually more sophisticated use of methods and media, for example, audio recordings in language teaching and in courses for blind people and the use of laboratory kits in subjects like electronics, radio engineering, *etc.* The founding of the British Open University in 1969 marks the beginning of a period in which degree-giving distance-teaching universities with full degree programmes, sophisticated courses, new media and systematic systems evaluation crop up in various parts of the world and confer prestige on distance education (Rumble and Harry 1982). Whereas up to the 1960s the large-scale distance-teaching organisations had-with very few exceptions-been private correspondence schools (one of which-Hermods in Sweden-had since 1959 been an official examining body for its own students), the new period saw publicly supported and established universities and schools becoming more and more important. An outstanding pioneer in this respect is the University of South Africa, which emerged as a development of the University of Good Hope, founded in 1873 as an examining body based on the model of the University of London. It started teaching at a distance in 1946. The University of South Africa was established as a distance-teaching university through a governmental decree of 1962.

What above all gives us reason to regard the early 1970s as a period of change in distance education is the new public recognition since then usually given to this kind of education. With few exceptions, as in Scandinavia, authorities had until then been sceptical. The creation of the Open University in the United Kingdom can be seen as the beginning of a more prestigious era.

The image of distance education in several countries changed from one of possibly estimable but often little respected endeavour to one of a publicly acknowledged type of education acclaimed as an innovative promise for the future. In the 1990s some 30 distance-teaching universities are active in various parts of the world.

In the twentieth century distance education has occurred in mainly two forms. One represents a large-scale approach with courses produced for hundreds and thousands of students and with tutoring at a distance provided by a number of tutors who need have had no part in the development of the course. The second represents a small-scale approach with the course writer in charge also of the tutoring, in which case courses are developed for small target-groups. Typical examples of the first type are the large correspondence schools and the distance-teaching universities, whereas the second type is typically represented by the Australian dual-mode universities.

In both these types the use of information technology and modern media has led to changes in the presentation of learning matter and, above all, in the student-tutor interaction. It has been claimed on the one hand that the introduction of computers and sophisticated media has meant a revolutionary metamorphosis of distance education, on the other hand that present-day stress on technology represents no more than a fad to be compared with the enthusiasm for programmed learning common in the 1960s. I reject both these views.

There can be no doubt that modem technology has led to great improvements. Search for information in databases and the emerging possibilities to apply hypertext approaches are no doubt promising elements in the presentation of subject matter, *i.e.*, the one-way traffic. Telefax and electronic mail can obviously eliminate the harmful procrastination characteristic of student-tutor interaction in writing. This implies an improvement of distance education that is of an evolutionary rather than revolutionary character. There is no change in the basic conditions: students still mainly study individually at a distance from, *i.e.*, not on the same premises as, their tutors, the communication is still brought about non-contiguously by media, now, however, at least in part of new kinds. Distance education has simply availed itself of the technical developments of modern society.

THE TARGET GROUPS AND THEIR REQUIREMENTS

As indicated at the beginning of this paper adults with occupational, social and family commitments were the original target group of distance education, and this is the one still mainly catered for. These students wish to educate themselves in their spare time either to improve and update their professional knowledge or to widen their intellectual horizons generally, to learn for practical purposes, for instance, applications of computer technology or a foreign language, or to acquire knowledge and insight for its own sake. To the generations that were young when the first correspondence schools and similar distance-teaching organisations started their work, the opportunities they offered were

very often the only chances available to compensate for faulty or insufficient early education. Distance education gave-and gives-gifted and hard-working people a possibility to study beside their jobs and other commitments. In some countries it had and may still have a pronounced careerist character. It served and serves upward mobility educationally, professionally and socially.

A new target group has emerged during the last few decades: university students taking individual courses by distance study as parts of degree curricula based on conventional study. Whereas prescribed pacing, the organisation of students in classes or groups as well as adaptation to university or school semesters and holidays are felt to be undesirable and unnecessary restrictions by the first-mentioned, larger category of students, they are largely acceptable and found natural by the new target group. In the latter case distance education is simply a form of distribution.

RESEARCH IN DISTANCE EDUCATION

Much of the early research in distance education focused on comparisons between delivery media such as television, video, or computer and traditional face-to-face teaching. Other research compared the effectiveness of one distance delivery medium over another. Most of these media comparison studies found no significant differences (NSD) in learning. Critiquing these early media comparison studies, Spenser (1991) points out that they tended to report comparative statistics that gave no indication of the size of differences, if any, between the types of instruction. Conclusions tended to be based on the presence or absence of a statistically significant result.

"When groups of research were reviewed there was a tendency to use a 'box score' tally approach, frequently resulting in a small number of studies favouring the innovation, a similar number favouring the traditional approach, and the vast majority showing NSD". Whatever methods have been used to report the results of media comparison studies and their instructional impact, these studies have yielded very little useful guidance for distance education practice. This prompted Clark (1984) to make the following observation: "Learning gains come from adequate instructional design theory and practice, not from the medium used to deliver instruction".

Although Clark's statement has been debated, educational technologists agree that the quality of the instructional design has a significant impact on learning. It is time, therefore, to move away from media comparison studies that often yield no significant differences and begin to examine factors such as instructional design, learning and instructional theory, and theoretical frameworks in distance education, which when applied to learning, might account for significant differences in levels of performance. The questions that need to be asked are not which medium works best, but rather how best to incorporate media attributes into the design of effective instruction for learning. Studies that compare two different instructional designs using the same medium may yield more useful results for practice than simple media comparisons. Little research has been

done to examine what happens in the learning process when students interact with various technologies. Research in the area of distance education falls into areas of traditional and exploratory research. Traditional research occurs within the field and is reported in the distance education literature. Exploratory research is often interdisciplinary and found in related literature. It is frequently the result of interest in educational application of newer technologies in various related disciplines.

The traditional research literature in distance education is brief and inconclusive. Both quantitative and qualitative studies have generally lacked rigour. Driven by practice, much research has taken the form of programme evaluation, descriptions of individual distance education programmes, brief case studies, institutional surveys, and speculative reports.

Although well-reported case studies offer valuable insights for further investigation, the literature in distance education lacks rich qualitative information or programmatic experimental research that would lead to testing of research hypotheses. Also, because of the international nature of the field, research is reported in international journals, many of which are not peer reviewed. A number of research reports are generated by governmental agencies and institutions responsible for large-scale distance delivery programmes. These may be proprietary and are often not readily available.

Much traditional research in distance education has focused on issues of technology. More than 23% of the literature reviewed concerned issues related to technology and the role of the distance educator. As we said, most of those related to technology were media comparison studies that resulted in no significant difference. Issues concerning new technological advancements were most frequently a concern of North American writers.

RESEARCH DEVELOPMENT

Scholars have approached the question of distance education research in a variety of ways. Coldeway (1990) notes that researchers in the field have not tested the various theories that have been advanced, and hypotheses have not been identified for experimental research. He calls for the development of a research base using, for example, Keller's Personalized System of Instruction to build a baseline of data for distance education research. Shale (1990) comments that research within the field is not productive because the field has limited itself to studies of past and present practices that look at "distance" as the significant concept. He calls for an examination of broader issues in education that look at communication technologies as part of education at a distance. He cautions that:

In sum, distance education ought to be regarded as education at a distance. All of what constitutes the process of education when teacher and student are able to meet face-to-face also constitutes the process of education when teacher and student are physically separated.

This view has not been popular within the distance education community. However, it has become apparent that more significant research dealing with

variables that affect distance learners is being done outside of distance education than within it. Model studies, often exploratory, are appearing not within traditional distance education literature, but across disciplines where researchers are examining the interaction of learners with newly developing technologies. Nonetheless, there are a number of significant research studies both in traditional and exploratory areas of distance education.

A few recent studies have attempted to examine learning style variables and the media and methods used in distance education. Davie (1987) conducted a study of the interaction of learning styles (as measured by the Kolb instrument) and computer-mediated communication, and noted the need to conduct similar studies using larger samples and the importance of examining the relationship of learning style to student achievement. Gunawardena and Boverie (1992) conducted a study that examined the interaction of learning styles and media, method of instruction, and group functioning in distance learning classes that used audiographics conferencing as the predominant delivery medium. The learning style instrument used for this study was the Kolb LSI (1985). The major finding of this study was that learning styles do not impact how students interact with media and methods of instruction, their instructor, or other learners. But learning styles do affect satisfaction with activities involving other learners. Accommodators appear the most satisfied and Divergers the least satisfied with class discussions and group activities. Class type, whether students were on campus or off campus, rather than learning styles impacted student satisfaction with media, methods, learner-instructor interaction, learner-learner interaction, group satisfaction, goal setting, and group climate. The results of this study cannot be generalized because of the small sample in the distance class. The authors suggest that further research involving larger samples is necessary to validate these results.

RESEARCH AND TECHNOLOGY

Garrison (1990) begins the discussion of technology with this statement:

Distance education is inexorably linked to the technology of delivery. It can be seen as a set of instructional methods based largely on mediated communication capable Of extending the influence of the educator beyond the formal institutional setting for the purpose of benefiting the learner through appropriate guidance and support. Without technology, a future for distance education does not exist.

Most distance education programmes today require the use of technology, and many authors are calling for revised evaluation techniques. In 1983, Clark startled the educational community with his statement that there is nothing intrinsic to technology that makes the slightest difference to student achievement. Hoko (1986) agreed with Clark in his hypothesis that there is no distinct advantage to one medium over another. Six years later, however, Clark (1989) called for an evaluation plan to determine both the basic needs of students and instructors and the technological components that mesh with those needs. Baker

(1989) went a step further by saying that the evaluation process must be ongoing. As each new technology emerges, evaluation of that technology should be done prior to and throughout its implementation.

Stubbs and Burnham (1990) take a slightly different view. They argue that most media evaluation models like the Reiser and Gagne model (Reiser & Gagne, 1983) do not deal with critical dimensions of distance education. In distance education, media provide primary rather than secondary materials for learning Winn (1990) suggests that the technology chosen for instruction may not affect the eventual achievement outcome, but "it greatly affects the efficiency with which instruction can be delivered". Distance education developers, worldwide, face the challenge of selecting the most efficient medium for delivery of instruction. Wagner (1990) believes that as technologies become more complex- *i.e.*, interactive television, computer based instruction, and teleconferencing- the need to be more accountable and effective when selecting and utilizing instructional delivery systems becomes increasingly more important.

Early distance education programmes relied primarily on print materials for instruction. This format is still the medium of choice in places like Spain and Latin America where the cost of broadcast television is considered prohibitive. Numerous texts and didactic guides are published yearly by the National University for Distance Education (NUDE) located in Spain. In addition to the print material, Spain and Latin America now supplement the printed material with a series of daily radio broadcasts from Radio Nacional de Espaha.

Spain and Latin America are not alone in their widespread use of print material. Garrido's article also includes Venezuela, which only recently instituted, on a limited basis, both television and audiocassette delivery systems to supplement text-based instruction. Costa Rica has a similar programme in operation. While many countries must rely on print to disseminate instruction, Turkey and other developing countries with large communication infrastructures already in place use broadcast television. As distance education increases worldwide, the need for continued modem delivery systems will continue.

Much of the literature originating in the United States, though not in other countries, discusses the advancement of technology to facilitate the delivery of distance education. Computer-assisted Learning (CAL) and computer conferencing lead the list for the number of articles. One reason may be that CAL and computer conferencing have allowed a shift from individualized, self directed learning to collaborative learning (Lauzon & Moore, 1989). Additionally, Lauzon and Moore report that CAL meets the diverse needs and characteristics of adult learners by providing the opportunity for the learner to control and pace the instruction. Qualitative research by Cheng, Lehman, and Armstrong (1991) supports the effectiveness of CAL and reports CAL to be "an effective teletraining device for academic institutions". Abrioux (1991), however, sees CAL as a somewhat questionable technological application. His research on language acquisition foreshadowed a need for student-to-student and student to-instructor interaction. Abrioux also questions the cost effectiveness of CAL

in terms of student achievement. While CAL was once viewed as one student working with material presented by one computer, advances in technology have allowed linkage of many-computers and many students. This linkage is often entitled computer conferencing.

In their discussion of computer conferencing, Davie and Wells (1991) support the need for interaction. They describe one of computer conferencing's most frequently cited characteristics as being its many-to-many capability. Computer conferencing is an ideal communication too] for bridging time and space among those who share similar interests. Lauzon and Moore (1989) note that computer conferencing is "effective in removing the barriers of time and space as constraints on communication". Their article goes on to describe "on-line communities that will be instrumental in the realization of a 'learning society' by transforming current distance education systems into on-line educational communities". Harasim (1990) observes that because of the democratic openness of the computer conference environment, all students have an equal opportunity to contribute. Although the majority of literature on computer conferencing is positive, Harasirn continues her response to computer conferencing by pointing out several opposing features. She reports that class members have difficulty reading the computer screens and following a variety of on-line, visual cues. She also cautions that distance educators should review the amount of material students are required to read both on and off the computer screen. While these comments are precautionary. and important to both students and instructors in distance education, an overall view of the literature indicates that the positive benefits of CAL and computer conferencing appear to outweigh the disadvantages.

A second technology often cited in current literature is interactive television with two-way audio and two-way video capabilities. Although the majority of literature reviewed interactive projects within the United States, Collis (199 1) reports from the DELTA Project (Developing European Learning Through Technological Advance) that nearly all of the countries involved expressed a need for modem interactive technology in Europe's future distance education projects. A further comment calls for teamwork and interaction. "The learning system should be capable of supporting team work in the classroom or between learners at different locations, enabling work material to be exchanged between and displayed at other locations. Canada has joined the United States and the countries involved with the DELTA Project in selecting interactive television technology because of its interactive modality for students and instructors. The term interaction in the literature does not exclusively refer to a two-way technologically mediated exchange. Cost factors, coupled with lack of access to the necessary components of interactive television, have led several institutions to give "interactive" a less mechanically oriented definition. The Ontario Institute for Studies in Education, Nova University (Scigliano, Joslyn & Levin, 1989), and the Dutch Open University (Meurs & Bouhuijs, 1989) all facilitate interaction by combining face-to-face meetings with computer-assisted learning

(Davie & Wells, 1991). Regardless of how interaction is defined, its importance cannot be underestimated, especially in the realm of distance education.

Television, another often cited technology, is becoming a widely used medium due to the availability of satellites, both in Europe and China. China's satellite television-based multimedia education system is the largest in the world (Gao, 1991). Gao continues by stating that, with a population of 1.2 billion people, Chinese satellite television is the only technology capable of reaching so many people and meeting their educational needs. Germany's academic Society for Adult Further Education based in Stuttgart also uses satellite television to disseminate instruction throughout Germany.

Technologies come in many packages, says Garrison (1989), but each must be scrutinized for its effect on the achievement of the learner, for its costs, and for the environmental conditions necessary for its implementation. Administrators of distance education should not attend exclusively to the issues related to technology. Research is needed to identify how technology interacts with students and how it affects teaching and learning.

Areas of interest to researchers in distance education have been categorized in a variety of ways. The International Centre for Distance Learning (ICDL) at the British Open University, the largest single database of distance learning literature, has divided topics in distance education into theory, student psychology and motivation, administration and support, curriculum development, teaching materials and resources, and institutions and staff.

RESEARCH AND STUDENTS

Although studies focusing on learners have received attention in the literature (18%), it is largely descriptive. Research-based articles, however, can be found in works by Tovar (1989), Wilkinson and Sherman (1990), and Baynton (1992). Aslanian and Brickell's (1988) qualitative research offers a very extensive profile of the distance education student in America. Their findings are congruent with international programmes, although the international research is generally empirical. Nearly one-fourth of the literature reviewed about students calls for student-instructor interaction in order to decrease anxiety and increase motivation. The need for interaction is additionally associated with the selection and implementation 'of specific media within the distance education course.

As a form of nontraditional education, distance education serves mainly adults, and those adult students possess unique needs, motivations, goals, and self-concepts. In a qualitative study with 1,000 adults, Aslanian and Brickell (1988) developed a profile of an adult distance education learner. They found that, in general, the students are married (61%), female (58% part-time students (80%), employed full time (71 %), and paying for their own schooling (60%). Of the adults surveyed, 75% were between the ages of 25 and 44 years of age. Apt and Enert (1983) compiled student characteristics at six open-learning programmes and found similar results. International results were found to be congruent in work done by Van Enckevort, Harry, Marin, and Schultz (1987) at

four European distance education universities. Administration, instructors, and curriculum designers must take the needs of the adult student population into account when proposing theoretical and andragogically based instruction designed for distance education programmes (Verduin &Clark, 1991).

The adult student generally enters the learning environment, whether traditional or distant, with a high degree of motivation. Knowles's (1984) learner focused theory of andragogy suggests that much intentional learning activity of adults is motivated by their desire to move from their current level of proficiency to a new, higher level. Verduin and Clark (1991) agree with both Knowles and Ehrman: "Discrepancies between adults' current level and desired proficiency level directly affect motivation and achievement in both learning activities and life roles".

Although adults possess a high degree of motivation, the technology associated with distance education, coupled with the distance separating the student and instructor, leads to high degrees of anxiety. Anxiety in learning has occasionally been described as helpful, but more often treated in terms of its negative affects. A negative view of anxiety comes from Darke (1988), who believes that anxiety can debilitate cognitive processing. The importance of student anxiety cannot be underestimated in facilitating two-way interaction between students and instructors in the distance education setting. The painful anxieties that learners experience in any instructional setting tend to be exacerbated when that learning is mediated by technology.

Other distance education researchers (Keegan, 1988; Lewis, 1988) have questioned the need for too much student/instructor interaction. They see a large amount of interaction as inhibiting the independence of the learner. Although distance education is premised on creating the potential for greater independence for the learner, it is often "just as confining and inflexible as other forms of education". Sewart (1987) suggests that distance education students, perhaps, have greater freedom, but with that freedom comes responsibilities. Freedom demands that the student make a number of important decisions that would normally be made for him:

It is an interesting and perhaps sometimes infuriating paradox; this provision of flexibility to cater for individuals needs inevitably results in increasing complexity of administrative and organizational procedures which may present the student with problems.

2

Philosophy and Organization of Distance Education

The organizational pattern and operating practices of a distance education facility are generally based upon the educational philosophy of that institution as well as economic and political restrictions (Verduin & Clark, 1991). Most educators would prefer a more student-centred model while politics and economics might dictate a more institution-centred approach with greater control and a larger number of students.

Three different modes of operation under which distance education can operate are identified by Rumble (1986), including: Sole responsibility-where the institution and its administration have distance education as their sole responsibility and purpose, such as with the Open University in the United Kingdom. Administration and faculty focus on distance education teaching methods and student needs, and are not controlled by other programmes or purposes. Development of teaching techniques and innovative practices are seen as primary benefits.

Mixed mode-institutions where both distance and conventional education occur, such as the University of New England in Australia and most traditional American universities. Organization may fall under a single department with university administration being responsible, several departments may offer distance education with each department administering its own programme, or a distinct unit may offer distance education in a variety of areas and be solely devoted to this purpose. The mixed mode approach may have the advantage of being able to draw upon the resources of the resident faculty and services, but a

disadvantage is that some faculty and administrators may consider distance education to be less effective and less important than campus-based instruction.

Consortium-a group of institutions or distance education programmes devoted to distance education as a means of broadening or sharing distance education programming. Students may register with their own institution and use centrally-developed learning materials with credits being easily transferable. This is one of the fastest growing segments of distance education (Verduin & Clark, 1991) but it also experiences administrative problems when it comes to collaboration between universities and conflicts in philosophical differences, teaching resources, and cost sharing. The University of Mid-America failed in its attempt at a consortium but efforts such as the Mind Extension University(r) are viewed as a success.

Any organizational or administrative structure must have effective communication for it to succeed. Distance education, with its diversity of activities and staffing, the nature of its students, and externally based instructional programming, requires very effective communication. According to Verduin and Clark (1991), information must flow in such a manner that all involved are aware of common goals, activities and procedures, and the appropriate feedback is possible whenever necessary.

Kaye and Rumble (1981) cite the problems of educational institutions in introducing distance learning programmes, and suggest that a major issue confronting many universities is how to resolve the conflict between distance education, which often requires the management and structure of a business enterprise, and traditional academic areas which have a completely different style of governance. These differences "often find expression in a conflict between academic 'freedom of action' and the necessity for maintaining effective production mechanisms" necessary for distance education course development and distribution.

The separation between innovation and organization can "converge" as the innovation moves towards institutionalization through boundary expansion and resolution of conflicts (Levine, 1980, p. 14). It is this integration process which is the goal of most distance education programmes at traditional universities, but studies suggest that there are often institutional barriers to the convergence of distance and mainstream education.

To focus on technologies without considering their role as a catalyst for change can adversely affect the ability of technologies to enact change. Heinich suggests that we tend to treat all technological innovations almost the same, yet technologies such as television can affect the power structure in education, and faculty prefer the power structure the way it is.

Power and politics are primary forces in the implementation process; and school systems, like other social systems, have to be viewed in terms of the seeking, allocation and use of power (Meyer & Rowan, 1978). According to Sarason (1990), the communication network, which is dependent on personal contact and on who knows whom, often identifies the path for implementation of an innovation.

Innovators have been accused of being so passionate about their innovation that their reality is distorted and they fail to consider the importance of building constituencies to help support their cause and Rogers (1983) even identifies a "pro-innovation bias" which often appears in the implementation of an innovation and any related research which follows. Educational innovations seem to receive strong support from a relatively small segment of adopters but may have limited support from the group effected. Bardach (1978) suggests that even when an effort is made to develop support from constituents, it is difficult to find a cause with "a broad commonality of interest that would form the basis for coalition building".

Educational change is technically simple and socially complex, and definitely not a linear process. Educational innovations such as the early distance education programmes were probably motivated by a "vision" that Fullan (1991) would suggest "permeates the organization with values, purpose, and integrity for both the what and how of improvement... its formation, implementation, shaping and reshaping in specific organizations is a constant process". For a vision to become a reality, Miles stresses that it must be "shareable" and be shared with others; "it provides direction and driving power for change, and the criteria for steering and choosing". And this vision must include a shared vision of the change process which can provide a strategy for implementation.

Although there are clear strategies for implementing innovations, change is often at the mercy of organizational culture. "Attempts at innovation in schools have usually ignored the cultural and structural traditions of the sociocultural system... If a school has a culture in place, and there is ample evidence to suggest it does, those involved in the rigorous maintaining of the status quo are not going to be eager candidates for innovation".

A case study of Athabasca University in Alberta, Canada by Shale (1985) showed some surprising results. Although the university was an "open" distance education facility and with a commitment to trying innovative educational approaches, over time it had become more and more traditional. In the beginning, the core of the academic programme was the instructional designer with few academic staff, and multi-media was used heavily. But this emphasis on innovation changed and now the role of the instructional designer is not as important as that of the teacher, courses follow a more traditional lecture approach, and little use is made of media except to enhanced written materials.

Shale suggests that understanding this shift back to the traditional lies "in a deeper understanding of what a university is" and whether a traditional university allows for change and innovation. The educational technology point of view appears to regard education as "packageable" while universities are traditionally characterized by process, academic staff, and research. Costs andthe time required to produce distance education courses are two factors suggested for this tendency to the traditional, but Shale also feels distance education has not dealt with some of the natural boundaries such as jurisdiction and coordination, factors which impact on the institutionalization of distance education programmes.

DIRECTIONS IN RESEARCH

Much of the research done to date has centred around the use of new technologies for teaching and distance education's effectiveness as a teaching medium. A predominance of this research has used survey questionnaires with closed-ended questions with the range of options determined by the researcher. This empirical research is useful for studying drop-out rates, learning about student preferences, and attempting to compare the variety of media used for delivery, but Morgan (1984) has urged that qualitative research methods be used to study distance education as a whole. Coldeway (1988) acknowledges that the focus of most distance education institutions is on the technology but suggests that the research is shifting to "the more human side" of the system as the programmes age.

Holmberg (1984), as an international authority on distance education, strongly urges undertaking inductive studies of distance education "organization" to look at administrative framework, processes of developing and distributing learning materials, interaction between system members, and other activities required by society and the educational establishment. This type of study has not been done and seems to have value for establishing new distance education programmes or making comparisons with other traditional and nontraditional programmes.

ROLES IN THE INSTRUCTIONAL PROCESS

A team approach to the development of learning materials is often considered the most appropriate for distance education. The team would be responsible for assessing adult needs, designing learning packages, providing guidance, and assessing performance, and it would include academic content specialists, instructional designers, writers and editors, media specialists, and specialists in adult learner behaviour and curriculum development (Verduin & Clark, 1991). These instructional development activities should support the institution's philosophy and goals, and the mission of the distance education programme.

If anything is evident in this team approach, it has the potential to be complex and open to interpretation. The roles of academic content specialists, instructional designers, writers and editors, media specialists, and specialists in adult learner behaviour and curriculum development can be seen to overlap and to not be very clearly defined. An educational technologist may have skills in instructional design, as a media specialist, in adult learning behaviour and in curriculum development, and their job may begin with assessing programme needs and end with product implementation. But their role may be perceived as someone working primarily to implement electronic technology into the learning system or simply be misunderstood. The counter problem is that "use of computers, television, teleconferencing, and other means of transmission does not make one an educational technologist".

The relationship between distance education and educational technology is viewed as strong, but the problem of defining roles for instructional designers/

developers is difficult. And the role of the educational technologist may be defined, not by the field, but by the organization's philosophy of education and their broader educational goals. Wagner (1990) suggests that an issue to consider is whether "distance education can afford to emphasize technology" or whether "it must emphasize instruction". Wagner suggests that educational technology can serve as a holistic approach where process and product are both components of the system.

DEFINITION OF DISTANCE EDUCATION

Distance education brings together students and teachers separated by geographical distance. Many distance education programmes operate online, allowing quality student-teacher interaction through live forums, chat, and e-mail. Since online gives people the flexibility to continue working, while continuing on with their educations.. In this competitive environment advancing your career has become more and more difficult. In that competitive environment online education providing platform to enhance your skills.

Distance education offers a wide range of online accredited degrees, including online MBA's, teaching certification, and Associate's, Bachelor's and Masters degrees in everything from a network management degree to online criminal justice degrees.

Why Distance Education?
- Learn on your time. Online education allows you to study when you have time—from early morning to late at night.
- No long commute. Your classroom is as close as your living room or home office.
- Keep your job; take care of your family. You don't have to give up important responsibilities to pursue an online education.
- Learn where you live. No need to relocate in pursuit of your online degree.
- Save money. You'll save on room and board, college tuition, classroom supplies, transportation costs, and more.

TEACHERS IN DISTANCE EDUCATION

TECHNOLOGY AND TEACHING

Most educational technologists do link distance education to technology and may view it as different from other forms of education. Claims about the affect of new technologies on learning have caused many people to suggest a change in the way new technologies are evaluated for distance learning. Although Salomon (1981) and Clark (1991) make the point that instructional strategies and not the medium are the key to effective learning, technology and production considerations rather than teaching-learning theory or the instructional development process are often the driving force behind distance education programmes.

The interest in utilizing "instructional technologies" to accomplish a variety of educational delivery needs has grown to the point where "preparing teachers to use technologies is assumed to be the main function and primary intellectual interest of the educational technologist". While Heinich feels that teacher preparation is needed, he points to this as a problem in defining the field of educational technology. Romiszowski (1981) suggests that the educational field "has been plagued with more than its fair share of solutions looking for problems" and suggests that developers often reflect a vested interest in technology or make premature decisions to the instructional solution before fully understanding the problem.

Studies on the use of various media in distance education have supported Schramm's view that "learning seems to be affected more by what is delivered than by the delivery medium" and Clark's analogy of media "not influencing learning any more than the truck that delivers groceries influences the nutrition of a community". Also, studies comparing education in the classroom with technologically-deliveredclasses (Beare, 1989; McCleary and Egan, 1989) showed no significant differences in academic performance.

Recent developments in technology are believed to be removing some of the disadvantages associated with media in distance education. Bates (1984) suggests that new technologies promise "a wider range of teaching functions and a higher quality of learning, lower costs, greater student control, more interaction and feedback for students". In fact, the 1990s are experiencing the emergence of digital media which has the potential to blur the lines which separate various media, as predicted by Baltzer (1985).

The issue of media vs. method is likely to continue to be debated in relation to distance education, but there is no doubt that distance education is different from other instructional approaches. A study by Gehlauf, Shatz and Frye (1991) on the reaction of teachers to the teaching experience in the traditional classroom compared to interactive television shows teachers wanting to cling to more traditional approaches but finding these methods not as effective, teachers feeling the need to be better organized, and feeling the need for training for distance education teaching.

DISTANCE LEARNING TECHNOLOGIES

Until the advent of telecommunications technologies, distance educators were hard pressed to provide for two-way, real-time interaction, or time-delayed interaction between students and the instructor or among peers. In the correspondence model of distance education, which emphasized learner independence, the main instructional medium was print, and it was usually delivered using the postal service. Interaction between the student and the instructor usually took the form of correspondence of self-assessment exercises that the student completed and sent to the instructor for feedback. Formal group work or collaborative learning was very rare in distance education, even though attempts have been made to facilitate group activities at local study centers.

Also, traditionally, distance education courses were designed with a heavy emphasis on learner independence and were usually self-contained. With the development of synchronous (two-way, real-time interactive) technologies, such as audio teleconferencing, audio graphics conferencing, and videoconferencing, it is now possible to link learners and instructors who are geographically separated for realtime interaction. However, the type of interaction that takes place is usually on a one-to-one basis, between one learner and another and between one learner and the instructor at one particular time. These technologies are not very suitable for promoting cooperative learning between groups of learners located at different sites. Also, the synchronous nature of these technologies may not be suitable or convenient for many distance learners.

The asynchronous feature of computer mediated communications, on the other hand, offers an advantage in that the CMC class is open 24 hours a day, 7 days a week, to accommodate the time schedules of distance learners. Although CMC systems may be either synchronous (real time) or asynchronous, it is asynchronous CMC, because of its time-independent feature, that is an important medium for facilitating cooperative group work among distance learners.

Current developments in digital communications and the convergence of telecommunications technologies, exemplified by international standards such as ISDN (Integrated Services Digital Network), make available audio, video, graphic, and data communication through an ordinary telephone line on a desktop workstation. Therefore, as we look at distance learning technologies today and look to the future, it is important to think in terms of integrated telecommunication systems rather than simply video vs. audio vs. data systems. More and more institutions that teach at a distance are moving towards multimedia systems integrating a combination of technologies both synchronous and asynchronous that meets learner needs. Therefore, while in the 1970s 'and 1980s many distance education institutions throughout the world used print as a major delivery medium, by the year 2000 many institutions will probably have adopted telecommunications-based systems for the delivery of distance education. This does not necessarily mean that print will no longer be used in distance education. It is more likely that print will be used as a supplementary medium in most telecommunications-based systems, and better ways of communicating information through print will be investigated and incorporated into the design of study guides and other print-based media.

In order to describe the technologies used in distance education, we have selected "The 4-Square Map of Groupware Options" that was developed by Johansen et al. (1991) which is based on recent research in groupware. This model seemed most suitable to our purpose, because we see distance education moving from highly individualized forms of instruction, as in correspondence education, to formats that encourage teaching students as a group and collaborative learning among peers. The "4-square map of groupware option" model is premised on two basic configurations that teams must cope with as they work: time and place. Teams or groups of people who work together *on a

common goal deal with their work in the same place at the same time as in face-to-face meetings, and sometimes they must work apart in different places and at different times, as in the use of asynchronous computer conferencing. They also need to handle two other variations: being in different places at the same time, as in the use of telephones for an audio teleconference, and at the same place at different times, as in workplaces, study centers, or laboratories. Based on these configurations, the 4 square model classifies four types of technologies that support the group process: (1) same time/same place, (2) different time/different place, (3) same time/different place, and (4) same place/ different time. These four categories are used for describing technologies that currently support distance teaching and learning.

While we use the 4-square model to discuss the major distance education technologies currently being used, we feel that this model does not lend itself very well to discussing new and future developments in integrated telecommunications. Since these integrated systems incorporate many of the features that we classify separately in the 4-square model, we have decided to describe new and future developments in a separate section titled "Future Directions and Emerging Technologies".

SAME TIME/SAME PLACE INSTRUCTION

Same Time/Same Place group interaction is the most familiar format of face-to-face meetings. Certain objectives in distance education programmes can only be met by meeting face-to-face. The British Open University, which teaches entirely at a distance brings students on campus during the summer to participate in laboratory experiments. When course objectives require the careful demonstration, observation, practice and feedback of life threatening procedures such as a surgical procedure, it is important to organize face-to-face meetings. In a face-to-face setting accepted practices are only modified slightly to accommodate electronic media. Basic technologies that facilitate a face-to-face meeting involve an overhead projector, a flip chart, electronic blackboard or a projection system that displays computer screens via a LCD monitor. At the more sophisticated end are desk top workstations for each group member which run on special software that helps the group to brainstorm, generate ideas, rank solutions and vote. Also, a record of the group process can be produced at the conclusion of the groups' activities. IBM's Decision Conference Centre in Bethesda, Maryland employs such sophisticated groupware to facilitate group decision making processes. However, innovative approaches are now being adopted to the design laboratory work at a distance by using technologies, as in the dissection of a fetal pig experiment that was designed by the University of Maine using a combination of two-way interactive television, videotape and group work at sites.

SAME TIME/DIFFERENT PLACE INSTRUCTION

There are two kinds of Same Time/Different Place Instruction: 1. a meeting through a telecommunications medium or teleconferencing where participants

who are separated by geographic distance can interact with each other simultaneously, and 2. the use of non-interactive media such as open broadcast television and radio to instruct a vast number of students at the same time without the ability for the students to call back and interact with the originators of the programme. Teleconferencing can be classified into four separate categories depending on the technologies that they use: audio teleconferencing, audiographics teleconferencing, video teleconferencing and computer conferencing. There are two types of computer conferencing: synchronous computer conferencing when two or more computers are linked at the same time so that participants can interact with each other, and asynchronous computer conferencing when participants interact with each other at a time and place convenient to them. Asynchronous computer conferencing is described under Different Time/Different Place instruction. The four major types of teleconferencing vary in the types of technologies, complexity of use and cost. However, they have several features in common. All of them use a telecommunication channel to mediate the communication process, link individuals or groups of participants at multiple locations, and provide for live, two-way communication or interaction.

One advantage of teleconferencing systems is that they can link a large number of people who are geographically separated. If satellite technology is used for the teleconference, then, there is no limit to the number of sites that can be linked through the combination of several communications satellites. In order to participate in a teleconference, participants usually have to assemble at a specific site in order to use the special equipment that is necessary for a group to participate in the conference.

The only exceptions are audio teleconferences which can link up any individual who has access to a telephone, computer conferences that can link up individuals, their computers and modems at home, or direct broadcast satellites that can deliver information directly to participant's homes. However, if more than two people are present at a participating site then it is necessary for the participants to gather at a location which is equipped with teleconferencing equipment in order to participate in a teleconference.

This may restrict access for some learners. In terms of control, participants will have control over the interaction that takes place in a teleconference only to the extent that the instructional design allows for it. However, if the teleconference is taped for later review, students will have more control in the use of the conference. The unique advantage of teleconferences is that they provide for two-way interaction between the originators and the participants. Teleconferences need to be designed to optimize the interaction that takes place during the conference. Interaction needs to be thought of not only as interaction that occurs during the teleconference but pre-and post conference activities that allow groups to interact. Monson (1978) describes four design components for teleconferences: humanizing, participation, message style and feedback. Humanizing is the process of creating an atmosphere which focuses on the

importance of the individual and overcomes distance by generating group rapport. Participation is the process of getting beyond the technology by providing opportunities for the spontaneous interaction between participants. Message style is presenting what is to be said in such a way that it will be received, understood and remembered. Feedback is the process of getting information about the message which helps the instructor and the participants complete the communications loop. Monson (1978) offers excellent guidelines for incorporating these four elements into teleconferencing design. The symbolic characteristics and the interfaces that are unique to each medium are discussed with the description of each technology.

Audio Teleconferencing. Audio teleconferencing or audio conferencing is voice-only communication. Even though it lacks a visual dimension, audio teleconferencing has some major strengths: It uses the regular telephone system, which is readily available and a familiar technology; it can connect a large number of locations for a conference; the conferences can be set up at short notice; and it is relatively inexpensive to use when compared with other technologies.

The interconnection medium for an audio teleconference is usually the telephone, which can incorporate microwave, satellite, fibre optic, or coaxial cable transmission. The conference call between three or more persons at different locations is the simplest type of audio teleconferencing. For multipoint teleconferencing among three or more sites, an audio bridge is required to enable sites to interact clearly. The bridge links the telephone lines together so that parties at each location can hear and talk to each other. Olgren and Parker (1983) observe that there are many system options for audio teleconferencing, but the most common forms are: (1) user-initiated conference calls or ("ad lib" teleconferencing), (2) operator-initiated or dial-up or (dial-out) teleconferencing, (3) dial-in or meet-me teleconferencing, and (4) dedicated audio networks.

In order to facilitate group-to-group communication, audio teleconferencing requires the use of some type of amplified telephone equipment with a loudspeaker and microphones. The equipment may be built into the room or may be portable. Audio teleconferencing equipment can be described as simplex, quasi-duplex, or full-duplex, depending on the kind of interactivity and interruptibility of the conference connection.

Olgren and Parker (1983) observe that one should keep in mind that voice communication is the backbone of any teleconferencing system, with the exception of computer conferencing. Sophisticated video or graphics equipment can be added to any audio system. But it is the audio channel that is the primary mode of communication. If the audio is of poor quality, it will have a negative impact on users of even the most sophisticated graphics and video technologies.

This is very important to keep in mind, because the evaluation of interactive television systems have shown (Dillon, Gunawardena & Parker, 1992) that the most often cited technical problem in television systems is the poor audio quality.

While expensive investments have been made in video and graphics systems, very little attention has been paid to the improvement of audio quality in video

and audiographics conferencing systems. Audio teleconferences can be enhanced by adding a visual component to the conference by mailing ahead of time printed graphics, transparencies, or a videocassette to be used during the conference. Each site must be equipped with an overhead projector and a VCR if such graphical or video support is used.

Audiographics Conferencing. Audiographics systems use ordinary telephone lines for two-way voice communication and the transmission of graphics and written material. Audiographics add a visual element to audio teleconferencing while maintaining the flexibility and economy of using telephone lines. Audio teleconferencing is now combined with written, print, graphics, and still or full-motion video information. Most audiographics systems use two telephone lines, one for audio and one for the transmission of written, graphic, and video information.

Currently, the simplest audiographics system is the addition of a fax machine using a second telephone line to an audio teleconference. Printed information can be exchanged during the conference using the fax machine so that visuals can be shared between sites. As a result of recent developments in computer, digital, and video compression technology, fairly sophisticated computer-based audiographics systems are available in the market. These systems combine voice, data, graphics, and digitized still video to create a powerful communications medium. The PC-based systems have specially designed communications software that control a scanner: graphics tablet, pen, and key board; and video camera, printer, and a modem. One of the key advantages of an audiographics system is the ability to use the screen-sharing feature of the system. Participants at different sites can use different colored pens to create a graphic on the same screen at the same time. This feature enables the use of collaborative learning methods that involve learners at the remote locations. Since each site is most often equipped with the same types of equipment, it is possible to originate instruction from any location. The systems allow for a higher degree of interaction than one-way video and two-way audio systems. If the system is equipped with a video camera, it is possible to bring video footage to the class or show three-dimensional objects. High-resolution, full-colour still video images can quickly be transmitted through dial-up telephone lines. Some systems have incorporated a keypad device that is used for polling participant's opinions and feedback. When the instructor asks a multiple-choice question, participants can use the keypad to key in their response. A central computer tabulates these responses, and the instructor gets an instantaneous statistical summary of the entire group's responses, as well as how each site responded. This is a good way of soliciting and getting feedback from the participants, so that the instructor can adjust his or her presentation depending on the responses received.

Because audiographics systems use regular telephone lines, they are much more cost effective than full-motion video systems. Participants need to be present at locations equipped with the systems in order to participate in a conference, and this may be inconvenient to some learners.

The systems enable the transmission of audio, graphics, data, and still-video information and create a moderate sense of social presence. 'Me human-interface depends to a large degree on the type of communications software that has been designed for the system. Most graphic systems can be mastered by novices with about I hour's training on the system.

Video Teleconferencing. Video teleconferencing systems transmit voice, graphics, and images of people. They have the advantage of being able to show an image of the speaker, three-dimensional objects, motion, and preproduced video footage. The teleconference can be designed to take advantage of the three symbolic characteristics of the medium: iconic, digital, and analog, where the iconic or the visual properties of the medium which is television's foremost strength can be manipulated to convey a very convincing message. Because of its ability to show the images of people, video teleconferences can create a "social presence" that closely approximates face-to-face interaction. Video teleconferencing systems are fully interactive systems that either allow for two-way video and audio, where the presenters and the audience can see and hear each other, or one-way video and two-way audio, where the audience sees and hears the presenter, and the presenter hears only the audience. During a video teleconference, audio, video, and data signals are transmitted to distant sites using a single combined channel, as in the use of a fiberoptic line or on separate channels. Audio is most often transmitted over a dial-up telephone line. The transmission channel can be analog or digital; signals can be sent via satellite, microwave, fibre optics, or coaxial cable, or a combination of these delivery systems.

The term video teleconferencing has become popular as an ad hoc one-time, special-event conference that usually connects a vast number of sites in order to make the conference cost effective. A video teleconference is usually distinguished from interactive instructional television (ITV), which is generally used to extend the campus classroom and carries programming for a significant length of time, such as a semester. ITV may use the same transmission channels as a video teleconference but is distinguished from video teleconferencing because of its different applications: video teleconferencing, an ad hoc conference, and ITV extending the classroom over a longer period of time.

Video teleconferences can be classified into two broad areas according to the technology used for transmission: full-motion video teleconferencing or compressed (or near-motion) video teleconferencing. Full-motion video teleconferencing uses the normal TV broadcast method or an analog video channel that requires a wideband channel to transmit pictures. The range of frequencies needed to reproduce a high-quality motion TV signal is at least 4.2 million Hz (4.2 MHz). The cost of a full-motion video teleconference is therefore extremely high. In the 1970s, conversion of the analog video signal to a digital bit stream enabled the first significant reductions in video signal bandwidth, making video conferencing less cost prohibitive. Therefore, in compressed-video, full video information is compressed by a piece of technology known as

a Codec, in order to send it down the narrower bandwidth of a special telephone line. The compressed video method is cheaper and more flexible than the TV broadcast method.

Full-Motion Video Teleconferencing. Full motion video teleconferencing became popular with the advent of satellite technology. For the past decade, educational developers have provided credit courses via satellite television over networks such as the National Technological University (for graduate engineering course), the Arts & Sciences Teleconferencing Service at Oklahoma State University, the TI-IN Network in Texas (for advanced placement high school courses). Both remote and urban schools and businesses have found these educational services valuable enough for their students and employees to make the investment in satellite hardware and tuition fees. Standard C-or Ku-band satellite TV signals can be received by consumer-level hardware costing well under $2,000. For a producer of educational programming, satellite delivery is still more economical than any other format for point-to-multipoint video transmission. Video compression standards and the introduction of fiber-optic cable infrastructure by many telephone and cable companies promises to make terrestrial line transmission of video much cheaper in the near future.

There are, however, at least two reasons that satellite television will probably remain available and, in fact, increase in the foreseeable future. First, there are still many remote areas of the world, even in North America, where telephone service, if it exists at all, is supported by antiquated technology barely able to provide a usable audio or data signal, let alone carry video. These remote areas simply need to point a relatively inexpensive satellite dish powered by solar panels, batteries, or generators-at the appropriate satellite to receive its signal. Additionally, new higher-powered satellites are making it unnecessary to use today's large unwieldy satellite dishes. The new generation of Ku-band satellite is already offering direct broadcast service (DBS) to European households. These receivers, known as VSATs (or very small aperture terminals), are no larger than I to 3 feet in diameter and currently cost less than $500.

The proliferation of smaller, less-expensive satellite television reception technology, along with the continued launching of new, higher-powered satellites, will ensure a continuing niche for this technology to deliver instructional video and data to even the remotest areas of the world that lack other information infrastructure.

Fibre optics is gaining in popularity as a transmission medium for video teleconferencing. Fibre optics is a transmission technology using an attenuated glass fibre hardly thicker than a human hair, which conducts light from a laser source. A single glass fibre can carry the equivalent of 100 channels of television or 100,000 telephone calls, and even more capacity is possible by encasing many fibers within a cable. Fibre optics offers several advantages: It can carry a tremendous amount of data at high transmission speeds; it does not experience signal degradation over distance as does coaxial cable; and it is a multipurpose system that can transmit video, audio, data, and graphics into the school through

a single cable. A single fiber-optic cable can carry over a billion bits per second, enabling several video teleconferences to run simultaneously. Many companies, universities, and states in the United States are building fiber-optic transmission networks to carry voice, data, and video.

Video teleconferencing can also use digital or analog microwave systems or dial-up digital transmission lines. Current developments centre on converging the different transmission channels and using a combination of telecommunications channels, satellites, fibre optics, microwaves, and coaxial cables to deliver full-motion video teleconferencing.

Compressed Video Teleconferencing. Video compression techniques have greatly reduced the amount of data needed to describe a video picture, and have enabled the video signal to be transmitted at a lower and less expensive data rate. The device used to digitize and compress an analog video signal is called a video codec, short for COder/DEcoder, which is the opposite of a modem (MOdulator/DEModulator). Reduction of transmission rate means trade-offs in picture quality. As the transmission rate is reduced, less data can be sent to describe picture changes. Lower data rates yield less resolution and less ability to handle motion. Therefore, if an image moves quickly, the motion will "streak" or "jerk" on the screen.

Currently most compressed video systems use either T-I or half a T-I channel. In a T-I channel, video is compressed at 1.536 Mbps, which is the digital equivalent of 24 voicegrade lines. Many users of T-I codecs opt for transmission at 768 kbps, which is half a T-I channel. The difference in video quality between transmission at 768 kbps and 1.536 Mbps is slight, but the cost savings are significant. With the proliferation of fiber-optic networks, some private video teleconferencing networks are taking advantage of high-quality 45 Mbps transmission. Digital video compression technology has allowed video teleconferencing to become less cost prohibitive. It is not as cost effective as audio teleconferencing and audiographics teleconferencing, but it may soon compete with more-sophisticated audiographics systems with future developments in video compression technology.

Desktop Video Teleconferencing. Future developments in video teleconferencing will move towards integrated desktop video teleconferencing combining audio, video, and data. A fusion of network, personal computer, and digital video has produced the field of desktop videoconferencing. Saba (1993) observes that several telecommunications companies have introduced integrated systems (voice, video, and data) that reside in a desktop computer and provide two-way synchronous communications with voice, image, and file-transfer and screen-share capabilities. This technology allows users to see each other, speak to each other, transfer application files, and work together on such files at a distance. Most systems do not require advanced digital communications technologies such as ISDN to operate. For those wanting to utilize ISDN, it is possible to purchase an ISDN card, while most systems are now being designed to work with telecommunications standards such as ISDN.

Education can use this technology as a method of presenting class material and forming work groups, even though they may be at a considerable distance from each other. An instructor could conceivably present material to the entire class either "live" or through delivery of an audio file to each student's electronic mail account. Students could then work together in real time if they wished to share information over telephone lines.

In one current example, German officials are making use of desktop videoconferencing to form what has been dubbed a "virtual government." As planing progresses to move offices from Bonn, the current capital, to Berlin, planners meet regularly using on-line workstations rather than traveling to meetings. The results provide faster interaction at a much lower cost.

As more technologies begin to dovetail, desktop videoconferencing becomes laptop videoconferencing. The use of cellular telephone technology combined with high-speed laptop modems will make it possible for people to hold meetings and work group sessions whether they are at home, in an office, or on the beach.

Interactive Instructional Television (ITV). Interactive instructional television (ITV) systems usually use a combination of "instructional television fixed service" (ITFS) and point-to-point microwave. They can transmit either two-way video and two-way audio, or one-way video and two-way audio, to several distant locations. The advantage of combining ITFS and microwave is that microwave is a point-to-point system, while ITFS is a point-to-multipoint system. Therefore, large geographical areas can be covered by the combination of the two technologies. Microwave connects one location to another electronically with its point-to-point signals, while ITFS distributes that signal to several receiving stations around a 20-mile radius. In the U.S., several states such as Iowa and Oklahoma support statewide networks that use a combination of ITFS, raicrowave, satellite, fibre optics, and coaxial cable.

In an ITFS and microwave television system, the course delivered over the system originates from a "studio classroom" on the campus. The classroom is specially designed to facilitate the extension of a conventional class through television. The audio feedback permits interaction between the teacher and students at distant locations. If a student viewing the class at a remote location has a question, he or she asks it through a talkback system, and it is heard by both on-campus and off-campus class members. The talkback system uses either the telephone or FM microwave technology, called radio talkback.

Interactive instructional television systems also use satellite, fibre optics, or compressed video to extend the traditional classroom. However, these systems are currently not as cost effective as systems that comprise of ITFS and point-to-point microwave.

Integrated Services Digital Network (ISDN).ISDN is a new international telecommunications standard that offers a future worldwide network capable of transmitting voice, data, video, and graphics in digital form over standard telephone lines or fibre optic cable. ISDN transmits media using digital rather than analog signals. In order to move towards a global network, ISDN promises end-to-end

digital connectivity, multiple services over the same transmission path and standard interfaces or conversion facilities for ubiquitous or transparent user access. Saba (1988) points out ISDN's applications for distance education: convergence, multitasking and shared communications. Convergence refers to the convergence on audio, video and data media in an integrated telecommunication system. Instruction is possible through voice, data, graphics, and video images. Multitasking refers to the variety of telecomputing capabilities that are available to the learner through integrated telecommunication systems that are based on minicomputers or microcomputers. Learners can gain access to online databases worldwide, and explore multimedia libraries comprising of digital sound, text and images. The shared communications feature allows the teacher and a group of learners separated by distance to work interactively on the same screen, sharing graphics, text, or data at the same time. Therefore, it is possible to solve a problem together or draw a graphic together even though a group of learners may be at different geographic locations. Currently available audiographics systems and desktop video teleconferencing systems provide for the features that will be available in a more user friendly and cost effective manner with the development of ISDN systems.

Broadcast Television and Radio. Broadcast television and radio fall under the classification of same-time/different-place instruction. The difference between broadcast television and radio and the previously discussed technologies under the same category is that broadcast television and radio do not provide for real-time, two-way interaction between presenters and participants.

These media, however, can be used to instruct a vast number of students at the same time, even though the students do not have the ability to call back and clarify a statement or ask a question in real time. Many distance education institutions in developing countries, as well as institutions in developed countries such as the British Open University, use broadcast television and radio extensively to deliver programming to a large number of distant learners.

In the United States, while television-both open broadcast cable and ITV-is the most popular media for delivering distance education, radio remains an underutilized medium (Gunawardena, 1988). It is in the developing countries that radio programming has been produced to either support and supplement print-based materials or to carry the majority of the course content.

In the United States, the most common pattern of open broadcast use for delivering distance education is for an institution to make arrangements with the Public Broadcasting Service (PBS) and/or a commercial television station to distribute the educational programming. One of the limitations of this type of distribution is that educational programming is confined to broadcast schedules predetermined by the broadcasting station, which may not be times convenient for students taking the course.

Bates (1984) observes that broadcasts are ephemeral, cannot be reviewed, are uninterruptable, and are presented at the same pace for all students. A student cannot reflect on an idea or pursue a line of thought during a fast-paced

programme without losing the thread of the programme itself. A student cannot go over the same material several times until it is understood. Therefore, it is difficult for the learner to integrate or relate broadcast material to other learning. Hence, the need for broadcast programming to be accompanied by support materials in the form of prebroadcast notes and follow-up exercises and activities. Research at the British Open University has indicated that "most students find it impossible to take notes while viewing, and those that do are usually very dissatisfied with their notes" (Bates, 1983, p. 61). Access to a videotape of the broadcast, however, will alleviate these problems by giving the learner control over the medium, with the ability to stop and rewind sections that were not clear.

Despite its ability to reach a large section of the student population, open-broadcast television is a one-way communication medium. It does not provide for interaction,(two-way communication) between the student and the teacher and lacks flexibility and ability to respond to student feedback. Since students cannot question the instructor to clarify problems, and since professional broadcast production "makes the learner dependent on 'responsible' broadcasting" (Bates, 1983, p. 61), this system of distribution can encourage passive acceptance of the instruction. To make the system interactive, open-broadcast distribution requires an added system to provide either an audio or audio-video return circuit.

Cable Television. In the United States, cable television began in remote rural areas, expanded into the suburbs, and has now penetrated into large urban areas. Cable has evolved from a way of improving reception in rural areas to a technology capable of providing many channels and even two-way video communication. Microwave relays have enabled cable operators to pick up signals from television stations too distant to be picked up over the air. Satellite interconnection of cable systems makes possible the importation of programming from virtually any part of the world. Today, cable technology is readily available and reaches a large number of homes and apartment units in the United States.

Where cable can provide access to a large section of the population of a given geographic area, it can be used to distribute distance education. Cable can be used to replay Programming offered over open-broadcast television, usually at more convenient times for the students than open-broadcast schedules, or used as a means of delivering nationally distributed television programmes, where terrestrial broadcasting facilities are not available.

Interactive cable in most cases is not two-way video. It is one-way video with telephone feedback from the viewer to the instructor, or a technology that provides viewers with one-way video and one-way audio feedback combined with keypads or polling devices with which they can transmit impulses to a central computer in response to questions posed by the instructor. Student responses, such as "yes," "no," "do not understand," "slow down," *etc.*, are immediately summarized by a central computer for the instructor, and often for the viewing audience, thereby adding an element of interaction to the experience.

DIFFERENT TIME/SAME PLACE INSTRUCTION

This type of instruction usually takes place in a lab or study centre where distance learners gather at different times to interact with instructors, tutors, and other students. Certain types of instructional objectives can only be successfully met by arranging for learners to conduct an experiment in a lab and observing this experiment for evaluation purposes. Local study centers are used by major distance teaching universities such as the British Open University to support the distance learner by offering meetings with tutors, discussion with peer groups, and library facilities. A survey of distance teaching institutions in the United States (Gunawardena, 1988) found that only 41% of the total number of institutions surveyed used local study centers. The types of services provided by most of the institutions were student access to media equipment such as videocassette players and microcomputers, and library facilities such as books, tapes, and cassettes, rather than arrangements for tutor-student interaction.

DIFFERENT TIME/DIFFERENT PLACE INSTRUCTION

The technologies used in this category are further classified as those that transmit one-way information such as print, audio-and videocassettes, and those that provide for interaction. Technologies that provide for interaction are divided into two groups: (1) those that permit interaction between the instructor and the learner, and among groups of learners such as computer-mediated communication those that provide learner-machine interaction as in computer-assisted instruction (CAI)/ computer-based training (CBT) and interactive video and videotex. CAI/CBT, interactive video., and videotex are highly individualized learning experiences that can be designed to give learners control over their learning. Since the technologies that provide learner-machine interaction are discussed elsewhere in this book, they will not be discussed in this chapter.

Print. Until the beginning of the 1970s and the advent of two-way telecommunications technologies, print and the mail system were the predominant delivery medium for distance education. Correspondence study relied primarily on print. to mediate the communication between the instructor and the learner. Currently, many distance education institutions in developing countries use print-based correspondence study as the main distance education medium, as the use of communications technologies is often cost prohibitive. Garrison (1990) refers to print-based correspondence study as the first generation of distance education technology. It is characterized by the mass production of educational materials, and Peters (1983) describes it as an industrial form of education. The difficulty with correspondence education has been the infrequent and inefficient form of communication between the instructor and the students. Also, it was difficult to arrange for peer interaction in correspondence-based distance education. The development of broadcast technologies and two-way interactive media have mitigated the limitations of correspondence study, especially in relation to facilitating two-way communication. However, print remains a very important support medium for electronically delivered distance

education. Printed study guides have become a very important component of electronic distance education. In a survey of distance teaching institutions in the United States that use television as a main delivery medium, Gunawardena (1988) found that a majority of institutions cited the study guide, which provides printed lesson materials and guidelines for studying, the most important form of support for distance learners. A study guide can steer and facilitate the study of correspondence texts, television programmes, and other components in a distance education course. A study guide, if well designed, can provide the integration between various media components and activate students to read and or listen to presentations of various kinds, to compare and criticize them, and to try to come to conclusions of their own. In a study guide or correspondence text, simulated conversation can be brought about by the use of a conversational tone, advance organizers, mathemagenic devices such as directions, and underlining, self-assessment, and self remediation exercises.

Audiocassettes. Audiocassettes afford the learner control over the learning material, because learners can stop, rewind, and fast-forward the tape. They offer great flexibility in the way they can be used, either at home or while driving a car. Since audiocassettes are a fairly cost-effective medium, they are easily accessible to students. Audiocassettes can be used to tape lectures or can be specially designed with clear stopping points in order to supplement print or video material. For example, in order to facilitate student learning, audiocassettes can be used to describe diagrams and abstract concepts that students encounter in texts. An audiocassette can be used to record the sound portion of a television programme if a videocassette recorder is not available, and an audiocassette can provide a review of a television programme in order to assist students to analyse the video material. The audiocassette can also be used to provide feedback to student assignments and is a very useful medium to check student pronunciation when languages are being taught at a distance. Audiocassettes can be an excellent supplementary medium to enrich print or other media and can provide resource material to distance learners. Since they can be produced and distributed without much cost, audiocassettes are also a very cost-effective medium for use in distance education.

Videocassettes. Videocassettes are like broadcast television in that they combine moving pictures and sound, but unlike broadcast television, videocassettes are distributed differently and viewed in different ways. An institution using videocassettes for distribution of video material to distant learners can use them as (a) a copy technology for open-broadcast, satellite, or cablecast programming; (b) a supplementary medium, for instance, providing the visual component for educational material carried over audio teleconferencing networks; (c) a specially designed video programme that takes advantage of the cassette medium, *e.g.*, its stop/review functions, so that students can be directed at the end of sequences to stop and take notes on, or discuss, what they have seen and heard.

An important advantage in using videocassettes is that students can exercise "control" over the programming by using the stop, rewind, replay, and fast-

forward features to proceed at their own pace. Videocassettes are also a very flexible medium allowing students to use the cassettes at a time that is suitable to them. Bates (1987) observed that the "videocassette is to the broadcast what the book is to the lecture".

If videocassettes are designed to take advantage of their "control" characteristics and students are encouraged to use the "control" characteristics, then there is opportunity for students to interact with the lesson material. Students can repeat the material until they gain mastery of it by reflecting on and analyzing it. The control features that videocassettes afford the learner give course designers the ability to integrate video material more closely with other learning materials, so that learners can move between lesson material supplied by different media.

"The ability to create 'chunks' of learning material, or to edit and reconstruct video material, can help develop a more-questioning approach to the presentation of video material. Recorded television therefore considerably increases the control of the learner (and the teacher) over the way video material can be used for learning purposes".

Bates (1987) discusses the implications of the "control" characteristics for programme design on videocassettes: (a) use of segments, (b) clear stopping points, (c) use of activities, (d) indexing, (e) close integration with other media (*e.g.*, text, discussion), and (f) concentration on audiovisual aspects. When videocassettes are used in a tutored video instruction (TVI) programme, where tutors attend video-playback sessions at workplaces or study centers to answer questions and to encourage student discussion, students can take advantage of the features of a lecture (on videocassette) and a small-group discussion, which gives them the opportunity for personal interaction available in on-campus instruction.

Computer-Mediated Communication (CMC). CMC supports three types of on-line services: electronic mail (e-mail), computer conferencing, and on-line databases. In e-mail systems, a message is routed by the system to the addressee's mailbox on the host computer and remains there until it is read by the addressee. This message can be read, replied to, left in the mailbox for later perusal, saved to the hard disk on the microcomputer, deleted, or forwarded to someone else. Most e-mail systems have a bulletin board feature that allows users to read and post messages and documents to be seen by all. However, the messages in the bulletin board system are not linked to each other and provide for only a very limited form of group communication.

Computer conferencing systems, on the other hand, provide a conferencing feature in addition to e-mail, which supports group and many-to-many communication. In these systems, messages are linked to form chains of communication, and these messages are stored on the host computer until an individual logs on to read and reply to messages. Most conferencing systems offer a range of facilities for enhancing group communication and information retrieval. These include directories of users and conferences, conference management tools, search facilities, polling options, cooperative authoring, the

ability to customize the system with special commands for particular groups, and access to databases. Databases can be made available on the same host computer used for an e-mail or computer conferencing system, or users can access public or private databases resident on other computers. Some of the well-known computer conferencing systems are: EIES, PARTI, CAUCUS, CONFER, COSY, VAX NOTES, and TEAMATE. Recent developments in groupware, the design of software that facilitates group processes especially in the CMC environment, will have a tremendous impact on facilitating group work between participants who are separated in time and place.

The key features of computer conferencing systems that have an impact on distance education are the ability to support many-to-many interactive communication and the asynchronous (time-independent) and place-independent features. It offers the flexibility of assembling groups at times and places convenient to participants. The disadvantage, however, is that since on-line groups depend on text-based communication, they lack the benefit of nonverbal cues at facilitate interaction in a face-to-face meeting. Levinson (1990) notes that research into education via computer conferencing must be sensitive to the ways in which subtle differences in the technology can impact the social educational environment. "The importance of social factors suggests that 'computer conferencing' may be a better name for the process than is 'computer-mediated communication'; the term 'conferencing' accentuates the inherent 'groupness' of this educational medium" (p. 7). Harasim (1989) emphasizes the necessity to approach on-line education as a distinct and unique domain. "The group nature of computer conferencing may be the most fundamental or critical component underpinning theory building and the design and implementation of on-line educational activities". Gunawardena (1993) reviews research related to the essentially group or socially interactive nature of computer conferences, focusing on factors that impact collaborative learning and group dynamics.

Globaled, a project that linked graduate classes in six universities-San Diego State University, Texas A&M University, University of New Mexico, University of Oklahoma, University of Wisconsin-Madison, and the University of Wyoming-to engage in the discussion of research related to distance education, is an example of the potential of computer conferencing to link students and instructors in learning communities (Gunawardena, Campbell Gibson, Cochenour, Dean, Dillon, Hessmiller et al]., 1994). While the six major participating universities conducted research projects and moderated the discussions of their findings on Globaled, several interested students and faculty from other U.S., and overseas universities, including the Pennsylvania State University and the University of Wollongong in Australia, participated in the discussions. The Globaled community had approximately 90 participants. Globaled was premised on a learner-centred collaborative learning model in which the learner would be an active participant in the learning process involved in constructing knowledge through a process of interaction and discussion with learning peers and instructors.

3

The Evolution of Distance Learning

Such a sweeping and generally accepted statement requires a careful look at distance education in general, and of the factors driving the almost geometric explosion in its implementation and acceptance.

Distance education, also called distance learning, has existed for centuries. It involves obtaining knowledge outside of the traditional avenues of attendance at learned institutions. Some recent definitions have focused on it as a new development, involving advanced technology. A few have even sought to define it in terms of a single technology ¯ usually the one they are reviewing or marketing. Others have viewed it simply as a recent extension of the classroom environment into a remote location. (Long dist tech 1990) Such definitions have proven too restrictive and fail to recognize the actual needs of distance education users or providers.

A better definition is provided by Ian Mugridge, who states that it is, "a form of education in which there is normally a separation between teacher and learner and thus one in which other means ¯ the printed and written word, the telephone, computer conferencing or teleconferencing, for example ¯ are used to bridge the physical gap."

This definition neglects a crucial factor of growing significance ¯ separation not just in space but in time. In the past, this time factor has often been a requirement of the technologies in use, and perhaps Mugridge is promoting an ideal of simultaneity. But in this age of increasing global communication, physical distance can involve significant time displacement.

It also implies that the ideal learning situation is in a face-to-face classroom setting, where all participants are physically present. Distance education,

therefore, would be an inferior version, trying hard to fit into this mold. It may be that this is true, but there is an increasing body of research which is exploring other options, especially in light of developing instructional technologies and changing social dynamics.

A simpler definition, more open to expanded possibilities, would be that distance education should provide whatever educational opportunities are needed by anyone, anywhere, at any time. Mugridge uses this as the definition for Open Learning, with distance learning as one means of achieving it, and perhaps this will prove more accurate, as 'distance education' continues to be "characterized by great diversity of practice."

Whatever words are finally settled on, the end result will be increased educational opportunities for broader segments of the population, accommodating different situations and needs.

USES DISTANCE EDUCATION

Before examining the tools available and under construction for the distance education market, it is important to understand what that market is, and how it is developing. Over 300,000 people are engaged in distance education in the United States alone.

Adult learning In the past, most distance education focused on adult learners, especially in rural districts. The largest use was for "short courses to help farmers and small businesses adapt to new technologies". This remains the most common usage worldwide. Estimates of the number of distance learners in China range from one to two million. Other adult-oriented programmes include the entire Open University in the UK, and extensive programmes from Norway to South Africa. (Distance/Faraway 1995) In recent years, complete post-secondary degree programmes have begun to appear.

K-12 Education The most rapidly-growing distance learning sector is the pre-university age group-what in the U.S., is referred to as K-12.

This is usually in the "form of curriculum enrichment modules and ongoing telecommunications projects" This is an exploding market, and Universities are increasingly providing advanced course programmes for middle school students ‾ courses for which there is not enough demand at their local school to allocate the resources, but which can prove profitable when made available to students at all of the area K-12 schools.

Disabled and Homebound Individuals who cannot easily travel, including senior citizens and the disabled, are natural candidates for distance education. Some people also may not be able to physically manipulate the technologies required ‾ a situation which will worsen as technologies evolve, unless specific action is taken to reduce the problems. Devices exist to alleviate physical barriers, and need to be incorporated in instructional designs.

Non-Native Language Speakers Increasing population migration has led to a growth in the numbers of people in all areas who are non-native language speakers, and who are unable to comprehend the classes normally on offer. (Day 1994)

Shift from Industrial to International Service Sector Economy 1956 saw the number of white-collar workers in the U.S., surpassing the number of blue-collar workers. By 1987, over 50% of the labour force in the U.S., could be categorized as "information workers." This has contributed to a number of factors which must be considered:

Changing Work Patterns: There has been an increase in alternative work arrangements, including flextime and work-at-home arrangements. Coupled with the flattening of institutional hierarchies engendered by new management theories (*e.g.*, Total Quality Management), this has led to greater individual responsibility and thus increasing learner autonomy. To maintain currency, workers increasingly need to collaborate "with widely dispersed colleagues and peers whom they may never have seen."

One effect has been a strong trend towards having programmes delivered to companies, especially in global corporations. Cathay Pacific airline executives in Hong Kong, for example, are enrolled in 3-year distance education MBA programmes through the University of Michigan. For many workers, taking a year or two off from work to go back to school is an increasingly unacceptable tradeoff. It is much tougher to look for another job afterwards, despite new training, since the training may not directly relate to the changes in the job which have come about during those years.

Changing Social Patterns: Traditional desires continue, such as the opportunity to hear speakers and take courses which would otherwise be unavailable in the local community. Expanding global awareness has also led to an interest in other cultures and desire for exposure to different social, cultural, economic, and religious environments. (Chadwick 1995-p16)

More significantly, the rising cost of living and tightening labour markets have led to more two-income families. It is no longer possible for many to return to school while their spouse works to support the family. And there is an increasing need to balance academic involvements with work and family commitments. People are less able to pick up and move for whatever reason.

Changing Education Patterns: Changing work patterns are leading in the direction of lifetime learning. Increasingly rapid changes in the work environment are bringing about a need for periodic retraining. There is a growing demand for employees with diverse and continually evolving skills, unlike the industrial era when the skills needed for different jobs were relatively fixed. Adults especially need to be able to begin courses at any time, rather than at the beginning of the traditional semesters. This usually involves self-paced tutorials, with some computer interaction (*e.g.*, the continuous registration policy at Athabasca University).

Many of these patterns result in distance learners who are older than traditional campus students, and "they are usually self-directed, experienced, and motivated by extrinsic factors such as job promotion and salary" (Knowles in Howard 1993)

All of these developments are also leading to a growing social acceptance of distance education.

CHANGING NEEDS/ROLES OF PROVIDERS

The changes in demographics of distance learners are tightly interrelated to the changes being experienced by education providers. These are changes which are expected to dramatically increase in intensity. Increasing Rate of Technological Change The rapidity of technological development has an enormous impact on distance education, and educational needs are providing much of the direction for end products. Tools for distance learning must be flexible and adaptable for a variety of different needs and situations ¯ including their own obsolescence, where possible.

Most importantly from an institutional viewpoint, the expectation has developed that expanding technology will enable expanding service, and that distance education will prove more effective and less expensive than constructing new campuses.

Decreasing Geographic Barriers Decreasing barriers of distance and communication are leading to the expansion of institutional boundaries and involvements. An "increased catchment area" beyond regional/national boundaries is developing, and many educational institutions are starting to move into overseas markets ¯ often in direction competition with local educational suppliers.

This is causing increasing competition between education providers for 'market share.' New paradigms are required concerning institutional boundaries. While this is not a new development, the increasingly real 'global village' is accelerating the pace, and these issues must be addressed. Growth of the Service Industry Whole economies are transforming from an industrial to a service foundation. To maintain competitiveness institutions need to be innovative. One idea is to offer courses for which there is not enough local demand to justify the expense of programme creation. Local course offerings can also be improved by planning programmes which would not be possible without distance education, such as pulling together part-time instructors who are geographically disparate experts in their fields.

One of the most interesting points raised is that by involving off-campus participants in course programmes which included local students, "adding this networked community to the discussion has sharply increased the quality of the course for [local] students."

At the same time, programmes of marginal quality will need to be eliminated and their resources redirected to strengthen mid-range programmes. Competitiveness will become increasingly important, and the potential learner will go to whoever can provide training tailored to their needs. We will continue to see Universities scrambling to experiment with different instructional paradigms.

What very few researchers mention is the strategic importance of providing improved support services to distance learners, from Library systems to remote course registration. These 'add-ons' may make the difference for a number of institutions.

Changing Institutional Contexts The California State educational system expects to as much as double its student population from 326,000 in the next ten years. To do this in the traditional manner would require building a new campus during each of those years ‾ a clear impossibility. While some doubt these sorts of figures, for now administrators are looking for options (DeLouhghry 1994-*Pushing*).

The ever-expanding directive to educate more people with limited or declining resources, without lowering standards ‾ to do more with less ‾ will lead to increased competitiveness in the distance education market along with demands for increasing faculty, staff, and student productivity. There are increasing expectations that technological development will lead to market expansion through non-traditional educational institutions and methodologies. There is an increasing need for institutional collaboration and resource sharing. This is coupled with a rising ability to pool human resources, share experts in different fields, and reduce duplication as technology develops.

Another driving force will be the need to develop new markets by offering unique educational experiences. One example is a collaborative exploration of the performing arts using a two-way video link between New York's Lincoln Centre and schoolrooms around the U.S.

Providers of distance education will need to carefully explore these changes, and make decision which match their local resources, target audience, and institutional philosophy. Institutions offering distance education programmes need to focus on what best fits their particular mission, goals, and circumstances.

LEARNING AND CHARACTERISTICS OF LEARNERS

The study of learning and characteristics of learners engages the largest number of researchers and includes studies of learning styles, attitudes, personality, locus of control, motivation and attrition. Included are general studies about cognition and metacognition as well as specific studies related to the particular needs of the distance learner. Many studies have been single group evaluations, few with randomization of subjects or programmatic investigations. Some exploratory research has involved a small number of participants in short interventions. Although these efforts yield interesting insights, they have not helped solve the problem of isolating and testing variables which might predict academic success.

Experimental studies often use thin descriptions and do not provide deep contextual information. Descriptive studies often lack generalizability are not qualitatively rich. Research reports which do appear in the literature are often inconclusive. Reports in the literature suggest that some combination of cognitive style, personality characteristics, and self-expectations can be predictors of success in distance education programmes. It appears that those students who are most successful in distance learning situations tend to be independent, autonomous learners who prefer to control their own learning situations.

Characteristics besides independence which appears to be predictors of success are high self-expectations and self-confidence, academic accomplishment (Coggins, 1988; Dille & Mexack, 1991) and external locus of control. Another motivation which reportedly influences academic persistence is the desire to improve employment possibilities, (von Prummer, 1990). Research findings suggest that it is the combination of personal (such as learning style), environmental and social factors which must be taken into account when predicting academic success in distance learning programmes.

Verduin & Clark (1991) examined learning styles within the distance education setting and reviewed the research done on learning styles by Canfield in 1983. Canfield developed a learning style inventory that conceptualized learning styles as composed of preferred conditions, content, mode and expectancy scores. Verduin & Clark (1991) believe this information can be helpful to educators in planning courses for students who will receive the instruction from a distance.

They indicate that an understanding of how individual learners approach learning may make it possible for the distance educator to see a pattern of learning styles and plan or adjust course presentations accordingly. They conclude by saying that adults may or may not learn more easily when the style of presentation matches the students learning style, but when the two do match, the students report being more satisfied with the course. Perhaps the most interesting work in cognition appears outside the traditional confines of the distance education literature. Research which examines the interaction of learners and delivery media is currently being conducted with multimedia.

These studies examine learning and problem solving in asynchronous, virtual environments in which the learner is encouraged to progress and interact with learning materials in a very individual way. In the Jasper experiment, for example, math problems are anchored in authentic real world situations portrayed on videodisc. It was hypothesized that the attributes of videodisc, which allow the portrayal of rich audio and visual images of a problem situation, would enhance the problem solving abilities of learners. Research results showed significant gains for the video-based group over the text based group, not only in solving the original Jasper problems, but in identifying and solving similar and related problems. The rich video-based format context was found to simulate a real world context for problem solving. In a similar vein, the Young Children's literacy project uses a Vygotsky scaffolding approach to support the construction of mental model building skills for listening and storytelling. Programmes like Jasper and the Young Children's literacy project provide robust sensory environments for developing metacognitive strategies and participating in critical thinking. These cognitive approaches to teaching abstract thinking skills have found fertile ground in the design and development of multimedia programmes. Individualized instruction delivered in multimedia settings has begun to blur the distinction between distance education and traditional education. The use of computer technologies to enhance thinking has generated interest in all areas

of the curriculum. Researchers are examining ways to decontextualize classroom learning by anchoring and situating problems to be solved as real life events (Brown, Collins, & Duguid, 1989). Collaborative interactions between learner and technology have caused cognitive psychologists to re-examine the effects of computer technology on intellectual performance. Salomon, Perkins & Globerson (Salomon, Perkins, & Globerson, 1991) call on educators to investigate the learning activities which new technologies promote. They argue that it is this collaborative cognitive processing between intelligent technology and learner which may have the potential for affecting human intellectual performance.

The authors make the distinction between effects with technology, in which the learner enters into a partnership in which the technology assumes part of the intellectual burden of processing information (calculator), and effects of technology and related transfer of skills. The former role of technology is what has been referred to by Pea (1993) as distributed cognition. The distributed model of cognition has its roots in the culturalhistorical tradition and is reflected in the work of Luria (1979) and Vygotsky (1978). This view of the distribution of cognition from a cultural-historical perspective maintains that learning is not an individual process but is part of a larger activity that involves the teacher, pupil, and cultural artifacts of the classroom. Knowledge does not reside with an individual alone but is distributed among the tools and artifacts of the culture. The technologies of today have created graphic interfaces that offer symbiotic and virtual environments distributed between human and machine.

One example of such a symbiotic environment is a computer conference network called the WELL. It is a "virtual community" where people meet, converse, and socialize. This "digital watering hole for information-age hunters and gatherers" has developed into a unique social and communication phenomenon. It functions as cafe, beauty shop, town square, pub, lecture hall, and library. In short, it is a network of communications in cyberspace, a true virtual community. The social and cultural ramifications of this type of community, which functions in cognitive and social space rather than geographic space, has vast implications for research in distance education.

These new learning environments are distance learning settings, and they prompt researchers to ask further questions: How do these environments enhance cognitive activities? Which personal learning-style factors are important to consider in designing interactive materials for effective instruction? Can we predict which programme elements are likely to enhance student learning?

COURSE DESIGN AND COUNNUNICATIONS

A number of research studies have been conducted around the issues of designing course material for distance education. A brief review of the literature reveals that the most frequently expressed concern in courses designed for distance learners has to do with providing the learner with adequate feedback (Howard, 1987; McCleary & Eagan, 1989). Learner feedback is listed as one of

the five most important considerations in course design and instruction, and it is identified by Howard as the most significant component in his model for effective course design.

Other major issues which relate to course design are effective instructional design, selection of appropriate media based on instructional needs, basic evaluation, and programmatic research. There appears to be little reported systematic research in this area because of the time and costs involved in conducting such large scale projects. McCleary and Egan (1989) examined course design and found that their second and third courses received higher ratings as a result of improving three elements of course design, one of which was feedback. In a review of the research, Dwyer (1991) proposes the use of instructional consistency/congruency paradigms when designing distance education materials in order to pair content of material with level of learners' ability. Others suggest models combining cognitive complexity, intellectual activity and forms of instruction for integrating the use of technology in course delivery.

Although consideration is given in the literature to elements of course design such as interactivity, student support, media selection, instructional design issues and feedback, little research has been reported other than evaluative studies. Few are generalizable to global situations. Although course design is a primary component of large scale international distance education programmes, little attention has been paid to the underlying social and cultural assumptions within which such instruction is designed. Critical theorists have examined how teaching materials and classroom practices reflect social assumptions of validity, authority and empowerment. Although the thread of critical theory has woven its way through the fabric of the literature in education, nowhere is it more important to examine educational assumptions underlying course design than in distance education.

Courses designed for distance delivery often cost thousands of dollars to produce and reach hundreds of thousands of students. Not only are hidden curricula in the classroom well documented, there is a growing body of evidence in the literature which critically analyses the impact of social norms on the production of educational media. In their book, Ellsworth and Whatley (1990) examine the ways in which particular historical and social perspectives combine to produce images in educational media which serve the interests of a particular social and historical interpretation of values. Distance learning materials are designed to rely heavily on visual materials to maintain student interest. Film, video and still photography should no longer be viewed as neutral carriers of information. In a seminal book of readings Hlynka and Belland (1991) explore critical inquiry in the field of Educational Technology as a third paradigm, equally as important as the qualitative and quantitative perspectives. This collection of essays encourages instructional designers to examine issues in educational media and technology using paradigms drawn from the humanities and social sciences; sociology and anthropology.

The examination of issues concerning the use of technology is especially important when designing courses for distance education. There are six factors that are particularly critical and need to be considered. In order to distinguish the characteristics of the communications technologies currently being used in distance education it is necessary to adopt a classification system, although any classification system may not remain current for very long with the constant development of new technologies.

MEDIA AND COURSE DESIGN

Several classification models have been developed to describe the technologies used in distance education (Barker, Frisbie, & Patrick, 1989; Bates, 1991; Johansen, Martin, Mittman, & Saffo, 1991). In a recent attempt to classify the media used in distance education, Bates (1993) notes that there should be two distinctions. The first is that it is important to make a distinction between "media" and "technology." Media are the forms of communication associated with particular ways of representing knowledge. Therefore, each medium has its own unique way of presenting knowledge, and organizing it which is reflected in particular formats or styles of presentation. Bates (1993) notes that in distance education, the most important four media are: text, audio, television, and computing. Each medium, however, can usually be carried by more than one technology. For example, the audio medium can be carried by audiocassettes, radio, and telephone, while the television medium can be carried by broadcasting, videocassettes, videodiscs, cable, satellite, fibre optics, ITFS and microwave. Therefore, a variety of different technologies may be used to deliver one medium. The second distinction is the one between primarily one-way and primarily two-way technologies. One way technologies such as radio and broadcast television, do not provide opportunities for interaction, while two-way technologies such as videoconferencing or interactive television, allow for interaction between learners and instructors and among learners themselves.

For the purpose of this chapter, we would like to expand on a definition adopted by Willen (1988) who noted that where distance teaching and learning is concerned, three characteristics have proved critical to the optimization of the study situation: a) the ability of the medium to reach all learners, or provide access, b) the flexibility of the medium; and c) the two-way communication capability of the medium. We feel that it is necessary to expand these three characteristics to include three others: the symbolic characteristics of the medium, the social presence conveyed by the medium, and the human-machine interface for a particular technology. Whatever classification system is used to describe the technologies, we feel that six important characteristics need to be kept in mind in the adoption and use of these technologies for distance education:

1. *Delivery and access:* The way in which the technology distributes the learning material to distance learners and the location to which it is distributed: homes, places of work, or local study centers. Student access to technologies in order to participate in the learning process is an important consideration.

2. *Control:* The extent to which the learner has control over the medium (the extent to which the medium provides flexibility in allowing the students to use it at a time and place and in a manner which suits them best). For example, the advantage of using videocassettes over broadcast television is that students can exercise "control" over the programming by using the stop, rewind, replay, and fast forward features to proceed at their own pace. Videocassettes are also a very flexible medium allowing students to use the cassettes at a time that is suitable to them.

3. *Interaction:* The degree to which the technology permits interaction (two-way communication) between the teacher and the student, and among students. Technologies utilized for distance education can be classified as one-way transmission, or two-way interactive technologies. One-way transmission media include printed texts and materials, radio programmes, open broadcast or cablecast television programmes, audiocassettes and videocassettes. Technologies that permit two-way interaction can be classified as either synchronous (real time communication) or asynchronous (time-delayed communication) systems. Audio teleconferencing, audiographics teleconferencing, video teleconferencing, interactive television, and real-time computer chatting when two or more computers are linked so that participants can talk to each other at the same time, are synchronous technologies that permit real time two-way communication. Computer-Mediated Communications (CMC) including electronic mail (e-mail), bulletin boards and computer conferencing when used in a time-delayed fashion are asynchronous technologies that permit two-way communication.

4. *Symbolic (or audio-visual) characteristics of the medium. Salomon (1979) distinguishes between three kinds of symbol systems:* Iconic, digital and analog. Iconic systems use pictorial representation; digital systems convey meaning by written language, musical notation, and mathematical symbols; and analog systems are made up of continuous elements which nevertheless have reorganized meaning and forms, such as voice quality, performed music, and dance. Television, forexample, uses all three coding systems to convey a message. Salomon (1979) observes that it is the symbol system that a medium embodies rather than its other characteristics that my relate more directly to cognition and learning. "A code can activate a skill, it can short-circuit it, or it can overtly supplant it" (Salomon, 1979 p.134).

5. *The social presence created by the medium:* Telecommunication systems, even two-way video and audio systems that permit the transmission of facial expressions and gestures, create social climates which are very different from the traditional classroom. Short et.al. (1976) define social presence as the "degree of salience of the other person in the interaction and the consequent salience of the interpersonal relationships...". This means the degree to which a person

is perceived as a "real person" in mediated communication. They define social presence as a quality of the medium itself and hypothesize that communications media vary in their degree of social presence, and that these variations are important in determining the way individuals interact. The capacity of the medium to transmit information about facial expression, direction of looking, posture, dress and non-verbal vocal cues, all contribute to the degree of social presence of a communications medium. Two concepts associated with social presence are "intimacy;" and "immediacy." Short et. al. (1976) suggest that the social presence of the communications medium contributes to the level of intimacy which depends on factors such as physical distance, eye contact, smiling and personal topics of conversation. They observe that the use of television rather than audio-only communication makes for greater intimacy, other things being equal. Immediacy is a measure of the psychological distance which a communicator puts between himself or herself and the object of his/her communication. A person can convey immediacy or non-immediacy non-verbally (physical proximity, formality of dress, and facial expression) as well as verbally. Therefore, social presence can be conveyed both by the medium (video can convey a higher degree of social presence than audio,) and by the people who are involved in using the medium for interaction (instructors who humanize the classroom climate may convey a higher degree of social presence than those who do not.) A recent study (Gunawardena, Campbell Gibson, Cochenour, Dean, Dillon, Hessmiller, et al., 1994) examines the concept of social presence in distance education and analyses student perceptions of two media: audiographics and computer conferencing.

6. *Human-machine interface for a particular technology that takes into consideration how the equipment interfaces with the end users:* The learner must interact with the interface or the technological medium in order to interact with the content, instructor, and other learners. This may include an activity such as pushing the press-to-talk bar on some microphones, or learning to use a graphics tablet to communicate graphically in an audio-graphics system. With the rapid growth of new telecommunications technologies, ergonomics or the design of human-machine interfaces has become an important area of research and development within the broader area of research related to human factors. The kinds of interfaces the technology employs has implications for the kind of training or orientation that both teachers and students must receive in order to be competent users of the medium. When selecting technologies for a distance learning programme, or when designing instruction for distance learning, these six factors need to be kept in mind. They are not entities in and of themselves but interact with each other to make up the total environment in which a specific medium operates.

The diagram below indicates this interaction. The evolution of geographic space into cyberspace has profound implications for communication, instruction and the design of the instructional message.

DISTANCE LEARNING

Distance education traces its origins to mid-19th century Europe and the United States. The pioneers of distance education used the best technology of their day, the postal system, to open educational opportunities to people who wanted to learn but were not able to attend conventional schools. People who most benefited from such correspondence education included those with physical disabilities, women who were not allowed to enroll in educational institutions open only to men, people who had jobs during normal school hours, and those who lived in remote regions where schools did not exist. An Englishman, Isaac Pitman, is credited as an early pioneer. He began teaching shorthand by correspondence in Bath, England in 1840. Students were instructed to copy short passages of the Bible and return them for grading via the new penny post system.

American university level distance education began in 1874 at Illinois Wesleyan University where bachelor and graduate degrees could be obtained in absentia. The Chautauqua movement in about 1882 gave the popular push to correspondence education.

The teaching of academic and vocational courses by correspondence became quite popular by 1900 and problems of quality and ethical practice came with the popularity. The National Home Study Council (NHSC) was formed in 1926 in part to address these issues. Accreditation of college and university distance programmes fell to the National University Extension Association in 1915.

The invention of educational radio in the 1920s and the advent of television in the 1940s created important new forms of communication for use in distance education. Educators used these new technologies to broadcast educational programmes to millions of learners, thus extending learning opportunities beyond the walls of conventional teaching institutions.

The development of reliable long-distance telephone systems in the early 1900s also increased the capacity of distance educators to reach new student populations. But telephone systems never played a prominent role in education until the introduction of new teleconferencing technologies in the 1980s and 1990s. Teleconferencing systems made it possible for teachers to talk with, hear, and see their students in real time-that is, with no delays in the transmissions-even if they were located across the country or around the world.

Distance education increasingly uses combinations of different communications technologies to enhance the abilities of teachers and students to communicate with each other. With the spread of computer-network communications in the 1980s and 1990s, large numbers of people gained access to computers linked to telephone lines, allowing teachers and students to communicate in conferences via computers.

Distance education also makes use of computer conferencing on the World Wide Web, where teachers and students present text, pictures, audio, and video. File sharing and communications tools like email, chats and and audio and video conferencing are integral to the Internet model.

Business and university level learners have used a conferencing method known as one-way video/two-way audio where television pictures that are transmitted to particular sites, where people can reply to the broadcasters with a telephone call-in system. Television pictures can also be transmitted in two directions simultaneously through telephone lines, so that teachers and students in one place can see and hear teachers and students in other places. This video-conferencing technology increasingly uses the Internet and Internet2.

PROGRAMMES IN THE UNITED STATES

In the United States, institutions of higher education, business, and the military use distance education for education and training. Millions of students have enrolled in television courses produced by colleges and universities around the country. Private businesses, including multinational corporations, have operated satellite television networks to deliver vocational training to employees throughout the world. The United States Army offers a wide range of online education programmes to its military personnel. Distance education offered through colleges and universities in the United States provides instruction in a wide range of academic and vocational subjects. The National University Telecommunications Network, (NUTN) based in Old Dominion University, Colorado, offers distance learning and teleconferencing resources for over 50 institutions of higher learning. Over time the technology has moved from satellite and telecourses to the Internet.

UNIVERSITY COURSES ONLINE

A growing number of institutions offer complete college degree programmes via the Internet. California's Virtual University lists a wide range of community college, college, and university courses offered online. The Western Governor's Association sponsors theWestern Governor's University (WGU). It offers online college degrees and courses from multiple universities. The innovative Open University, started in 1971 in Britain and has been copied around the world. The British Open University offers a master's degree in the field of distance education to anyone in the world who can access the Internet. Listings of virtual universities and much more information can be found on the American Distance Education Consortium (ADEC) and the Distance Education Clearinghouse Web sites. Others can be found using routine Internet search methods.

THE VIRTUAL SCHOOL

Several states have introduced virtual high schools and virtual schools. A 1991 WestEd study defines the virtual school as "an educational organization that offers K-12 courses through Internet or Web-based methods." The statewide

Florida Virtual School probably is the most notable because of its breadth and depth. The Massachusetts nonprofit VHS Inc. creates collaborative partnerships with schools. Other virtual schools are locally based or created via charter schools. The University of California Santa Cruz's University of California College Prep online (UCCP) began as an online programme to provide advanced placement courses to small and middle size high schools. It has expanded to include core academic courses.

THE CALIFORNIA ADULT BASIC EDUCATION EXPERIENCE

California provides adult education and literacy services through a multi-provider system. The bulk of the state and federal resources go to the K-12 adult schools. Community colleges offer basic education services through their noncredit programmes on some 9 campuses. Library literacy programmes and community based advocacy organizations also offer very important literacy, basic education and ESL services, though in limited numbers.

There has been little motivation for the literacy and community based organization programmes to experiment with distance learning. The federal English language/civics (EL/Civics) grant programmes initiated in 2001 included a distance learning emphasis though there was little provider interest.

MODELS OF E-LEARNING

Electronic multimedia interactive courses for key capabilities development, virtual tutorials with remote trainers and experts, online seminars, distant conferences – all these forms enable to realize knowledge sharing and transfer within the company. Blended learning that combines conventional learning, e-learning courses and distant collaboration technologies – contribute to the most effective training and development.

Modes of E-learning System

1. *Mode:* Individual learning in electronic course—Certificate on e-learning course completion
2. *Mode:* Special Training programfor BU's department with e-learning—Certificate on Training programme completion

The Use of Characters in e-Learning: Learning professionals are constantly agonizing over how to gain the benefits of e-Learning, while maintaining that level of learner engagement that occurs in the classroom. One development is the use of animated characters, which can engage learners in a way that draws them into the e-Learning experience. Immersive learning is one of the most effective learning techniques, and animated characters can help create an immersive environment. The characters, and their audio, visual and content cues need to create an experience that both engages and enhances the learning process. Corporate training has 'latched onto' this 'avatar' tool. These avatars, computer depictions of humans, are being used increasingly as imaginary coaches, co-workers and customers in computer-based training sessions designed

to help sharpen sales skills, reinforce leadership expertise or boost management prowess. By using avatars, companies find they can combine the best parts of both face-to-face training and computer-based learning. Like other computer-based training programmes, those using avatars can be cheaper and more efficient than human trainers, and deliver a more consistent message. At the same time, they offer an almost human touch that may help reinforcethat message.

What is a Character Simulation?

The idea of a character simulation is to engage the learner in an experience where a "virtual person" speaks, interacts, and helps to guide the learning experience. This character could be a likeness of a real person within a company, an expert in the field, or an anonymous character with a real personality. The personality is brought to life through visual impact, choice of language, attitude, and their voice.

There are three levels in which characters can be used:
- *Peer level-Instructor or Coach:* Someone, in this case, acts like your equal and helps you thru situations.
- *Expert Instructor:* The character, in this case, is a manager, a professor or potentially a well-known expert.
- *Authority Figure:* Here, the character is the "boss."

Why use Character Simulations?

- *Characters Motivate Learners:* One of the biggest benefits of well-designed characters is credibility. When motivating and educating, you must exude trust that the content is correct, relevant and valuable. The fact that avatars don't tire, miss-planes, or get sick means that you can interact and be motivated on your schedule-not theirs.
- *Characters Create Interest and Fun:* Characters create interest and also inject humor – which is the number one requirement (according to computer 'gamers') – in order to bring a character 'to life.'
- *Characters can Demonstrate Soft Skills:* Characters can demonstrate behaviour along with voice. This makes it a perfect tool for teaching soft skills. Research has repeatedly shown that communication is more about 'how' a message is delivered than the message itself.
- Characters can Drive Higher Learning: One of the biggest flaws of e-Learning programmes, is their inability to engage the learner. Research shows that character based simulations drive measurably higher rates of completion, learning, retention and overall job impact.

Typical Applications for Character-Based Simulation: Character simulations are increasingly being used within e-Learning programmes. Our characters are used for:
- Patient/student education
- Customer service training
- Customer self-service
- And communication skills training.

Characters Playing a Role Within Programmes: Often characters are used within an e-Learning programme in a particular section or topic. For example, characters can be used to:

- *Provide Motivational Statements:* Many training courses, open with a motivational segment about what people will gain from taking this course. Your audience will pay more attention to 'benefit statements' when they are delivered by an animated character, than when provided by text or straight audio.
- *Guide for Personalized Learning:* Pharmaceutical companies often create programmes for their representatives to take-based uponpersonalized roadmaps. When offering employees e-Learning programmes with 'no' guide, or having an animated guide: over 80% preferred an animated guide that explained the roadmap.
- *Deliver Brief Updates:* Animated characters can quickly disseminate brief updates to their employees. Often a character is created as the company spokesperson, and this character then delivers everyday news, important notifications, or a 'message of the week' from the executives.
- *Make Dry Material Interesting:* Often the purpose of the character is to build a helpful relationship with the learner. Dull material is the nemesis of many training programmes. The character can allow the audience to come away with the belief that they were not only heard, but also understood.

E-LEARNING TOOLS

As academic staff, we all have our own preferred teaching methods which suit our personal style and discipline area. For many of us, the carefully considered integration of e-learning tools can enhance these pedagogic approaches and enable varied and improved interaction with students at all levels, both on and off campus. We are reminded by Biggs (2002) that aligning all aspects of our teaching, from learning outcomes through teaching methods to assessment, is vital to ensure the continued quality enhancement of the learning experience we offer to students. In this context, e-learning needs to be considered as a fully integrated component of the whole educational process. (Introduction to eLearning at GCU). E-learning is firmly embedded in many of the current educational theories.

For example, it is widely recognized that learning is a social process (Wenger, 1999, Vygotsky, 1978) and Fowler and Mayes (2000) explain how learning relationships can encourage the conceptualization and re-conceptualization cycle which facilitates deep understanding. They describe how interactive courseware and online discussions can play a major role in supporting these cognitive processes by engaging the learner in meaningful dialogue with tutor and peers. Laurillard's Conversational Framework (2001) also illustrates the crucial nature of communication in the learning process and highlights a series of actions and interactions which can be supported to varying degrees by new technologies. (Glaskow Caldonian University, 2004).

E-learning tools such as Blackboard, Centra, Wimba, *etc.*, encourage student collaboration; improve team working skill and independent thinking. Many of the developing e-learning tools encourage student motivation and desire to remain in online educational environments.

The online learning community offers a wide array of e-learning tools. As educators and developers we must determine which tools fit our pedagogical needs before we can determine which tool to incorporate into our e-learning strategy.

Levels of Granularity

In their book, E-learning Tools and Technologies, William and Katherine Horton (2003) break down each category into the level of granularity. The definitions are as follows:

Create

- *Curriculum:* Creating curricula consisting of locating and integrating separate courses into a coherent sequence or other structure.
- *Course:* Creating courses requires integrating separate clusters and pages of content as well as providing overall navigational mechanisms such as a table or content or index.
- *Lesson:* Creating lessons requires selecting and linking pages or other objects into a coherent navigational structure.
- *Page:* Creating pages requires entering text and integrating it with graphics and other media. It may also include inserting cross-reference hypertext links.
- *Media:* Creating medial components requires creating the individual pictures, animations, sound, music, video sequences, and other digital media.

Offer

- *Curriculum:* Hosting curricula and setting up online schools requires presenting these collections of courses to learners in ways that show relationships among the individual products and perhaps tracks which the learner had accessed or completed.
- *Course:* Offering individual courses requires ways of making them available to learners as a coherent whole. It may also require tracking the parts of the individual courses they have accessed and completed.
- *Lesson:* Offering lessons requires the ability to present multiple pages or other components as a coherent whole.
- *Page:* Offering individual pages requires dispatching them to learners as requested.
- *Media:* Offering media components requires supplying them as requested. It may also require storing them economically and streaming them efficiently.

Access

- *Curriculum:* Accessing collections requires tools to find them where offered and enrol or subscribe to them.
- *Course:* Accessing individual courses requires the capability to open the course for display, choose from its lessons, and navigate among them.
- *Lesson:* Accessing pages requires a way to request them and to display them when they arrive.
- *Page:* Accessing pages requires a way to request them and to display them when they arrive.
- *Media:* Accessing media components requires the ability to play or display the individual media.

Tools for the Different Categories

William and Katherine Horton list different tools for the different categories. They are:

Create

Definition: Processing of authoring and integrating content

Types: Course Authoring

- *Definition:* Creating a course without the webmaster; includes implementing instructional strategies, creating menu and navigation schemes, and authoring pages
- *Interact with:* Media Editor, Web Server, LMS
- *Level of Granularity:* Course, Lesson, Page
- *Examples:* Authorware, DazzlerMax, Lector Publisher, ToolBook, OutStart, Web Course Builder

Website Authoring

- *Definition:* Creating HTML pages and linking them to produce entire websites
- *Interact with:* Course Authoring, Media Editor, Web Server
- *Level of Granularity:* Lesson, Page
- *Examples:* Dreamweaver, FrontPage, GoLive, NetObjects Fusion
- *Specific type:* Blog
- *Definition:* Web-based personal diaries
- *Examples:* Blogger, Radio UserLand, Manila, MySpace

Testing and Assessment

- *Definition:* Creating and conducting assessments
- *Interact with:* Course Authoring, Website Authoring, LCMS
- *Level of Granularity:* Media
- *Examples:* Respondus, Perception, Hot potatoes, Quiz rocket, Random Test generator Pro, Test Generator

Media Editors

- *Definition:* Creating, editing and "web-readying" drawings, icons, photographs, animations, sound, video and other medial included in e-learning
- *Interact with:* Course Authoring, Website Authoring, LCMS, Media Servier, Media Player and Viewer
- *Level of Granularity:* Media
- *Examples:* Director, Flash, Fluition, GRiNS Pro Editor for SMIL, HotMedia, LiveMotion, LiveStage Professional, Producer, Presenter, One.
- *Specific types:*

Graphic

Definition: Guide and inform the learners
Examples: Canvas, Fireworks, Freehand, Illustrator, Paint Shop Pro, Photoshop, Visio

Animation

Definition: Create drawings in motion
Examples: 3ds max, Animation Master, Cool 3-D, Poser

Audio

Definition: Capture analog and digital audio
Examples: Acid Pro, Cool Edit Pro, Multitrack Studio, Peak, Sonar

Video

Definition: Edit streaming images
Examples: Final Cut, Movie Maker, Acid Pro, Premier, VideoStudio

Virtual World

Definition: Create 3-D scenes
Examples: 3D Canvas Pro, AC3D, Internet Space Builder, Site Sculptor

Media Utilities

Definition: Special-purpose tools such as screen capture, screen recording, and software simulation
Examples: FullShot, HyperSnap, SnagIt, Snapz Pro, Camtasia, Captivate, TurboDemo

Content Converters

- *Definition:* for transforming documents, presentations, graphics and other content to formats that can be used in e-learning and on the Web. With converter tools, you author content in your familiar word processor, spreadsheet, presentation programme, drawing programme or other tool.

- *Interact with:* Web Server, Web Browser, Media Player and Viewer
- *Level of Granularity:* Course, Lesson, Page, Media
- *Specific Types:*
  Microsoft PowerPoint
  Examples: Impatica, Breeze
  Microsoft Word
  Examples: WordToWeb, Transit Solutions

Offer

Definition: Makes sure the e-learning you create can be accessed by learners conveniently and efficiently by making e-learning available over a network, administering your e-learning offerings, and controlling and tracking access Types:

Web Servers

- *Definition:* To deliver web pages and other medial requested by a web browser
- *Interact with:* Content creation tools, Web Browsers
- *Level of Granularity:* Course, Lesson, Page, Media
- *Examples:* Apache HTTP server, Internet Information Services

Learning Management Systems (LMS)

- *Definition:* To administer courses and students
- *Interact with:* Course Authoring, LMS, Web Browser
- *Level of Granularity:* Course, Lesson, Page
- *Examples:* Aspen, Blackboard, Pathlore, Docent, ANGEL, Moodle

Learning Content Management Systems (LCMS)

- *Definition:* To assemble and offer courses made up of reusable content modules
- *Interact with:* Course Authoring, LCMS, Web Browser
- *Level of Granularity:* Curriculum, Course
- *Examples:* Centra, Aspen, Docent

Collaboration Tools

- *Definition:* To enable fluid communication among distributed learners; Help people work and learn together at a distance
- *Interact with:* Web Browser, Medial Player and Viewer
- *Level of Granularity:* Course, Lesson, Page
- *Types:*
  — Synchronous – existing at the same time
  — Chat and instant messaging– immediate, spontaneous exchange of messages
  — Whiteboard – online blackboard

— Application sharing – presenter shares programmes or windows with participants
— Presentations – add visuals to a lecture
— Audio conferencing – participants talk with one another
— Video conferencing – participants see and hear each other
— Online meeting tools – meet with participants from distant locations
— Asynchronous – not occurring at the same time
— Email-sending and receiving messages electronically
— Online discussion – exchange of ideas from distant locations
— Test messaging – spontaneous exchange of messages
— Web tour – taking a tour of a distant location
— Online Voting – voting from distant locations

Virtual-School Systems or Course Management Systems

- *Definition:* To conduct instructor-led learning over the network; Hybrid category combining capabilities from learning management content management, and collaboration systems
- *Interact with:* Website Authoring, Media, Testing and Assessment, Web Browser
- *Level of Granularity:* Curriculum, Course, Lesson, Page, Media
- *Example:* Mambo

Media Servers

- *Definition:* To deliver sound, video and other dynamic media efficiently over the network
- *Interact with:* Web Servers, Media Editors, Media Player and Viewer
- *Level of Granularity:* Media
- *Examples:* Darwin Streaming Server, Helix Universal Server, QuickTime Streaming Server, SGI Media Server, Video Charger, Windows Media Services

Access

Definition: Learning requires tools to find, navigate, display and play e-learning content.

Types: Web Browsers

- *Definition:* A programme used to view HTML documents
- *Interact with:* Web Servers, Media Players and Viewers
- *Level of Granularity:* Course, Lesson, Page, Media
- *Examples:* Internet Explorer, Netscape, Mozilla/Firefox, Amaya, AOL, Opera, Lynz, MSN TV, Palm OS and Pocket PC

Media Players and Viewers

- *Definition:* Play dynamic media, such as video and audio or property file formats, such as PDF or flash. Media players can play many file formats; media viewers are generally play only their own file formats
- *Interact with:* Web Server, Web Browser, Media Server
- *Level of Granularity:* Page, Media
- *Examples of Media Player:* QuickTIme Player, Windows Medial Player, RealOne Player, WinAmp Player
- *Examples of Media Viewers:* Flash, Acabat Reader, Microsoft Office Viewers, Authorware, Director, Quest, ToolBook

Synchronous Tools

Centra: Saba's Centra is a synchronous e-learning tool that can be utilized in many different ways, and has many capabilities. Centra can be used to set up a virtual classroom; it can be used in a university setting and school setting. Centra can also be used for Web seminars and virtual meetings. Some of the features associated with Centra are real-time interactivity, allowing student and teacher, or two corporations to connect and meet with each other, as if in the same room. There is a whiteboard available for interactivity, you can poll students, or the students can raise their hand, there is a text chat, as well as the microphone feature which allows one to talk instantly and another to give instant feedback verbally.

It is also possible to show websites and other software during a Centra session. The teacher or meeting leader has the use of multimedia, and the ability to manage the multimedia. The teacher can also integrate various multimedia capabilities such as Flash, Shockwave, animated pictures, and streaming audio and video, as well as PowerPoint slides. It is also possible to give online tests and quizzes to evaluate the learners understanding of the subject matter being presented. Another powerful feature is its ability to be integrated with other learning management systems and software such as Blackboard.

Macromedia Breeze

Macromedia's Breeze is also a synchronous e-learning tool that has many of its own capabilities as well and has many of the same features that Saba's Centra exhibits. Again some of the features that Breeze contains are course and content management, integration with other software including other Macromedia products.

Breeze also has the survey feature, you can also record the sessions, set up meeting rooms, share applications and use whiteboards, use of a camera is supported as well as real-time verbal communications. Breeze can also have multiple presenters, has the ability to have multiple people in video conferencing, and use of polling. PowerPoint is also available to use through Breeze to control your presentations and meetings, or virtual classroom. Another great feature of Breeze is its ability to convert one language into another to eliminate language barriers when presenting to people of other nationalities or backgrounds.

Horizon Wimba

Horizon's Wimba is a versatile e-learning tool that allows for dual-way live voice and video for real-time classrooms and interaction between student and teacher. Wimba also incorporates a public and private chat. Files such as PowerPoint, Word, Excel, HTML, web pages, images, movie clips, PDF and Flash can be used to present material to the learners. Wimba includes interaction between student and teacher by using the whiteboard feature, using polls and quizzes, and also surveys. Past classes or session scan be recorded and can be made available for playback at a later date. One of the great features of Wimba is its ability to be incorporated with other learning management systems like Blackboard and WebCT.

LearnLinc

LearnLinc is another synchronous learning tool that has many of the features all the other software and tools have only it isn't as well known. LearnLinc has the feature of real-time video and audio conferencing or classroom presentations and participation. LearnLinc allows the sharing of applications such as PowerPoint, between student and teacher, as well as synchronous web browsing. LearnLinc incorporates electronic hand raising, allows for feedback, and question and answer sessions. Some of the other features are that you can view class lists, view your learner's screens, break into smaller groups, and keep track of participation as well as a group chat room.

Authoring Tools

The concept of an authoring system is not a new one. As long as there has been computer-based learning-and that's well over 20 years now-we've had highly sophisticated tools to assist us in product development. Most developers agree that e-learning product should conform to the standards of the Web-HTML, JavaScript, perhaps a little Flash or Java-and not require users to download enormous plug-ins just so they can view the output of legacy authoring systems. On the other hand, not all e-learning developers have access to programming support and will not want to be restricted to simple HTML. They need something more than generalist web tools.

Authorware

One of the best tools available for creating online training is Authorware. You can reduce learning time and speed development with the familiar Macromedia user interface. Dockable panels can be grouped together, collapsed, or expanded as needed, providing a smooth, highly configurable workflow. The visual interface lets you develop rich media e-learning applications without scripting. Just drag and drop icons to create your application's logical outline, and use menus to add content. You can leverage existing PowerPoint presentations to rapidly create rich multimedia e-learning content and deliver

applications with the click of a button to corporate networks, CD, and the Web. One-button publishing integrates and automates all the steps in the publishing process, and offers such features as batch-processing and customizable settings.

Knowledge Objects are prebuilt templates with wizards that drastically cut your development time. Use them to accelerate both large and small authoring tasks, from creating application frameworks and quizzes to installing fonts or locating a system's CD-ROM drive. Just drag and drop from the Knowledge Object gallery, and then fill in the content. Create courseware that can connect to LMS and that complies with standards from the Aviation Industry CBT Committee (AICC) or the ADL Shareable Courseware Object Reference Model (SCORM). Users work with the wizard to decide what information to get or send to the LMS. The Knowledge Objects handle all the complicated back-end communications with the LMS. LMS Knowledge Objects can communicate through ADL and HACP, as well as over LANs.

PowerPoint

Not many e-learning developers or instructional designers think of PowerPoint as a tool for building online courses. Surprisingly, PowerPoint is the second most frequently used tool for creating computer-based training applications – Dreamweaver being number one. The truth is that PowerPoint, when used correctly, can help you create rich, compelling, and instructionally sound e-learning content.

Initial content from an SME in many cases is created in PowerPoint. E-learning developers and instructional designers often use PowerPoint to create outlines or storyboards – it's easy, convenient, and quick. Also most organizations have an enormous amount of information that already exists in PowerPoint format, which lives on servers and PCs all over the enterprise. Virtually anyone, whether tech savvy or not, can quickly get up to speed using PowerPoint. In fact, most people have created some kind of presentation with the tool. It's not difficult.

An e-learning developer or instructional designer can take the core materials and enhance them. And this enhancement can be done in PowerPoint-the native format of the content. Rather than convert the SME's training presentation over to another tool, the instructional designer or developer can augment and improve the original within the same tool using the same format.

This means a SME's PowerPoint presentation can be used "as is" with narration added in Breeze if the delivery need is immediate. If more time is available the original materials can be enhanced to add richer media, interactivity, quizzing, and improved instructional design. Links can also be added to slide content to provide non-linear navigational design. Materials can also easily be enhanced by inserting pre-existing Flash movies or software simulations directly into a PowerPoint slide.

PowerPoint comes with numerous design and presentation templates. The design templates get you started with the graphical look and feel and the presentation templates provide a skeleton for arranging and outlining your actual content.

Interactivity in any form of e-learning greatly enhances both the appeal and the effectiveness of learning. The PowerPoint Breeze plug-in makes it very easy to add quizzes, tests, and surveys to e-learning content. (The scores and data from these can be sent directly to your AICC/SCORM LMS.)

The Breeze plug-in simplifies the addition of audio narration. Adding narration to online training content has been proven to increase retention rates. In most cases it is also the learner's preferred mode of receiving instruction or information.

Very often the simplest approaches to a problem are the most effective. Tools designed specifically for e-learning authoring can be used to produce some wonderful online content, but only if time permits — and usually it doesn't. By utilizing PowerPoint you can significantly increase the speed of development of e-learning by using an authoring tool with which your SMEs are already familiar.

Using a few customized PowerPoint templates to guide content organization and content creation you can rapidly create online content that is engaging, effective and instructionally sound.

4

Theoretical Constructs in Distance Education

Recently, a wider range of theoretical notions has provided a richer understanding of the learner at a distance. Four such concepts are transactional distance, interaction, learner control, and social presence.

Transactional Distance. Moore's (1990) concept of "transactional distance" encompasses the distance that, he says, exists in all educational relationships. This distance is determined by the amount of dialogue that occurs between the learner and the instructor, and the amount of structure that exists in the design of the course. Greater transactional distance occurs when an educational programme has more structure and less student-teacher dialogue, as might be found in some traditional distance education courses. Education offers a continuum of transactions from less distant, where there is greater interaction and less structure, to more distant, where there may be less interaction and more structure. This continuum blurs the distinctions between conventional and distance programmes because of the variety of transactions that occur between teachers and learners in both settings. Thus distance is not determined by geography but by the relationship between dialogue and structure. Saba and Shearer (Saba & Shearer, 1994) carry the concept of transactional distance a step farther by proposing a system dynamics model to examine the relationship between dialogue and structure in transactional distance. In their study, Saba and Shearer conclude that as learner control and dialogue increase, transactional distance decreases. It is not location that determines the effect of instruction but the amount of transaction between learner and instructor. This concept has

implications for traditional classrooms as well as distant ones. The use of integrated telecommunication systems may permit a greater variety of transactions to occur, thus improving dialogue to minimize transactional distance.

Interaction. A second theoretical construct of recent interest to distance educators, and one that has received much attention in the theoretical literature, is that of interaction. Moore (1989) discusses three types of interaction essential in distance education. Learner-instructor interaction is that component of his model that provides motivation, feedback, and dialogue between the teacher and student. Learner-content interaction is the method by which students obtain intellectual information from the material. Learner-learner interaction is the exchange of information, ideas, and dialogue that occur between students about the course, whether this happens in a structured or nonstructured manner. The concept of interaction is fundamental to the effectiveness of distance education programmes as well as traditional ones. Hillman, Hills, and Gunawardena (1994) have taken the idea of interaction a step farther and added a fourth component to the model learner-interface interaction. They note that the interaction between the learner and the technology that delivers instruction is a critical component of the model, which has been missing thus far in the literature. They propose a new paradigm that includes understanding the use of the interface in all transactions. Learners who do not have the basic skills required to use a communication medium spend inordinate amounts of time learning to interact with the technology and have less time to learn the lesson. For this reason, instructional designers must include learner-interface interactions that enable the learner to have successful interactions with the mediating technology.

Control. A third theoretical concept receiving attention in the distance education literature is that of independence and learner control. Studies that examine locus of control (Altmann & Arambasich, 1982; Rotter, 1989) conclude that students who perceive that their academic success is a result of their own personal accomplishments have an internal locus of control and are more likely to persist in their education. Students with an external locus of control feel that their success, or lack of it, is due largely to events such as luck or fate outside their control.

Thus, externals are more likely to become dropouts. Factors of control that influence dropout rate have been of concern to distance educators as they search for criteria to predict successful course completion. Baynton (1992) developed a model to examine the concept of control as it is defined by independence, competence, and support. She notes that control is more than independence. It requires striking a balance among three factors: a learner's independence (the opportunity to make choices), competence (ability and skill), and support (both human and material). Baynton's factor analysis confirms the significance of these three factors and suggests other factors that may affect the concept of control and which should be examined to portray accurately the complex interaction between teacher and learner in the distance learning setting.

Social Context. Finally, the social context in which distance learning takes place is emerging as a significant area for research. Theorists are examining how the social environment affects motivation, attitudes, teaching, and learning. There is a widespread notion that technology is culturally neutral, and can be easily used in a variety of settings. However media, materials, and services are often inappropriately transferred without attention being paid to the social setting or to the local recipient culture. Technology-based learning activities are frequently used without attention to-the impact on the local social environment. Computer-mediated communication attempts to reduce patterns of discrimination by providing equality of social interaction among participants who may be anonymous in terms of gender, race, and physical features. However, there is evidence that the social equality factor may not extend, for example, to participants who are not good writers but who must communicate primarily in a text-based format (Gunawardena, 1993). It is particularly important to examine social factors in distance learning environments where the communication process is mediated and where social climates are created that are very different from traditional settings. Feenberg and Bellman (1990) propose a social factor model to examine computer networking environments that create specialized electronic social environments for students and collaborators working in groups.

One social factor particularly significant to distance educators is social presence, the degree to which a person feels "socially present" in a mediated situation. The notion is that social presence is inherent in the medium itself, and technologies offer participants varying degrees of "social presence' (Short, Williams & Christie, 1976). Hackman and Walker (1990), studying learners in an interactive television class, found that cues given to students such as encouraging gestures, smiles, and praise were social factors that enhanced both students' satisfaction and their perceptions of learning. Constructs such as social presence, immediacy, and intimacy are social factors that deserve further inquiry.

CONCERNS OF TEACHING PROFESSION

But what is empirical situation? What are the explicit and implicit value? articulating themselves in the visible and invisible concerns of the teachers? To be sure, one finds a great deal to cause concern and at the same time much that gives hope.

SECURITY VALUE

Security value appears to be paramount in the concerns of the organized teaching profession. Their struggles are for better and higher salary scales, automatic and additional avenues of promotion, enhanced dearness allowance, continuance of examination remuneration, provision for more faculty housing or increased house rent allowance, and liberal loans for house-building or for buying scooters and cars. There is nothing inherently wrong in these demands the teacher is surely entitled to a reasonably comfortable standard of life and to a respectable social status, but when agitational methods ignore and sacrifice

the interests of the learners or tarnish the image of the teacher in the eyes of the learner, thus incapacitating the teachers from performing many specific roles, the situation begins to cause worry. The public at large, especially the thinking section of it, would evince greater sympathy for the teachers' cause if they assert themselves equally for raising academic standards, promoting academic excellence and showing willingness to do whatever is necessary for the purpose. It is unfortunate that on some of the major crises of higher education the organized and vocal section of the academic profession maintains a tantalizing silence. This is a distortion that needs to be corrected.

ATTITUDE TOWARDS WORK

During the Commission's visits to the colleges and universities, another feature of the educational scene came to light, and this is the wide prevalence of private tuition in colleges-which is not just of one or two students who find it difficult to get along without the assistance of a teacher, but large scale tuitions from which some teachers earn much more than their salaries. The overtone of this practice is that in many cases tuition does not result in intensive coaching but in assistance towards disclosing of question papers or in enhancement of marks. This is a very painful reality, but it is difficult to gather information of this kind from questionnaires. However, the other fact, repeatedly mentioned by parents, students and conscientious teachers, was that many teachers took their duties lightly, did pot prepare their lectures, dictated notes which they had themselves made years or decades ago, cut their classes, and paid little attention to the difficulties referred to them by their students.

ATTITUDE TO REFORM

It is obvious that no educational reform has a chance to survive if teachers do not support it in adequate measure. A lukewarm, or sometimes cynical approach on the part of teachers often dooms a reform. An initiative for change coming from 'the rank and file teacher or from his organisation is something unknown in our country. But refusing to take a stand on the minimum number of working days is a non-learning ethic that is being, promoted Institutions of higher learning today are often symbolic of indiscipline. Student indiscipline is followed by karamchari indiscipline and even the teachers have often joined forces with them. Who should then assume the responsibility of setting things right? A sizeable section of the teaching community does not take its obligation to students seriously. If curricula are out of date, and ineffective teaching methods reduce education to an uninspired routine, or if the learning needs of first generation learners are given no thought or if standards of judgement of academic quality in education and research become diluted in the spirit of " sab chalta hai" (everything goes), who indeed is morally responsible? Again, when in recruitment or promotion organized demands are weighted in favour of mediocrity or even non-performance, the teaching profession, with pursuit of excellence as one of its cherished values, abdicates responsibility.

From time to time, an elite section of the academic protest against inroads into the legitimate autonomy of educational institutions to take all decisions, particularly about their internal functioning, through the prescribed university bodies. This is a heartening sign, but at the same time there is a section of teachers who, for petty gains, invite political or bureaucratic intervention sometimes by allowing situations to arise where delegations or dharnas specifically seek intervention from ministers, parliamentarians or political parties. Not many in power can resist such temptations.

Organized opinion and strength of the teaching profession has not demonstrated conspicuous capacity to take a bold and determined stand, against erosion of the autonomy of the university system. We must clarify however that we are not advocating the autonomy of the ivory tower. Today our universities and colleges have to have numberous links with the community, developmental activity in the region, research institutions and industry, *etc.*

Hence the university is part of the total system, and it cannot remain aloof from the research educational and developmental activity on the whole. Boards of studies, boards of research and councils for extension activity would naturally have non-teacher professionals, scientists or even relevant government operatives represented on them.

CREATIVITY AND RESEARCH

Pursuit of excellence, creativity and research are acclaimed to be central to the value system of the teaching profession. With regard to students, it is most important that taking things merely on the basis of authority, without sufficient questioning and examination, is to be discouraged and a positive effort should be made to cultivate an enquiring mind, an exploratory and experimental approach, and an urge to reflect and introspect. This cannot be done if the teacher cannot set an example, or if the teacher himself is dogmatic, opinioned and unimaginative.

Only a creative person can excite the often dormant qualities of imagination and speculation among students, and can turn them on for creative activity from the writing of stories or poems to great works of art and science. In regard to creative work by teachers themselves, it may be said that it not only contributes to effective teaching but also enables either academic or social problems to be solved, in both cases spreading the benefit of the research far and wide. Involvement of teachers in researches relevant to regional or national development may in fact raise the prestige of educational institutions and bring them resources from hitherto untapped agencies.

Teachers may In turn use students in a carefully planned manner to undertake dissertations in higher classes, or projects and studies in lower classes, to create a data base and an analysis of the same to sharpen their creative talent and at the same time provide the back-up for objective grassroots planning of social and economic development. There are tremendous opportunities, but what is the reality?

SELF PERCEPTION AND REGULATION

We have discussed the crucial role of the teacher in influencing young minds on the question of values, and we have analysed the values that have to be inculcated if society has to be held together and if it is to progress towards the goals we cherish. We are also aware that it is easy to make idealistic demands from the teachers on the basis of human and social relations which prevailed a thousand or more years ago.

But in our view, it cannot be denied that the teacher has a special position because of his mission or his duty or professional responsibility. He cannot afford to get lost in the norms of social behaviour which happen to prevail-because who then will show us direction or pull us out of the morass? As a man devoted to learning, to 'he pursuit of truth in his creative endeavours, and hence being in a position to see farther than many others-as a social critic, the teacher has to struggle for the propagation of the right values. Therefore, we believe that teachers should be the first to introspect, and scrutinise their own value system so as to raise it to the highest moral level, and they should not shirk from imposing severe restraints on themselves in order that their word may have effect and their Conduct may set an example which others may follow.

The questionnaire also explored what the teachers, students and the community consider to be unacceptable behaviour on the part of a teacher. Here a number of questions were asked and people were asked to rank them in the order of repugnance. Partiality in assessment of students was considered to be the worst behaviour by 71.4 per cent of the community in universities, and instigating students against other colleagues was considered as the worst by the college community.

Teachers own responses are indeed very healthy 80 per cent or more teachers considered it against professional ethics to earn money by publishing "bazaar notes", teaching from notes prepared long ago, dictating notes instead of lecturing, favouritism in grading, skipping classes, instigating students and undertaking tuitions to earn money. In fact instigating students against other teachers had the highest position amongst undersirable activities both for college and university teachers, the second position going to dictating notes instead of teaching.

These healthy opinions could be the basis of spelling out what can be defined as unacceptable behaviour. It would be better if professional associations of teachers took the initiative in giving final shape to such a definition because they should be interested in protecting the honour of their members. But reluctance to do so would naturally lead to such behaviour being defined by the authorities and then we would have only ourselves to blame.

It is shocking that nearly half the teachers think that only a few of their co-professionals have personal integrity and devotion, or pursue for academic excellence or even have commitment to students' welfare or community service. Absence of scientific temper is even more conspicuous for both categories of teachers. Obviously, if teachers are to be the inevitable instrument for dissemination of value-oriented education, they will have to reform themselves by their own effort.

Many other endeavours are being researched, tested, evaluated and those that merit implementation are gradually incorporated into the educational curriculum. A detailed documentation is beyond the scope of this article; however, the following are a few examples. Distance education; Values education; Environmental science education (ESE) (Sarma, Rao & Patnaik, 1985); Computer assisted instruction (CAI) (Monahty, 1985); School-based inservice education and training (SBINSET) (NCERT, 1988a); Teaching of English as a second language (TESL) (NCERT, 1988b); Socially useful productive work (SUPW) (Ruhela, 1983). The educational enthusiasm in the country is encouraged by the prospects and potential for a strong Indian society in the 1990s and beyond. In fact, "with quantitative expansion of educational facilities, there is now a greater emphasis on qualitative improvement" (Reed Information Services, 1991).

A Central government Bill has recently been drafted to provide the National Council of Teacher Education (NCTE) with statutory status. The main functions of the NCTE will be to prepare norms, standards, and guidelines for teacher education; to provide for essential links among concerned agencies and their proposed programmes; and to advise the Central and State governments, University Grants Commission, universities, and allied educational agencies regarding priorities, policies, plans and programmes (MHRD, 1992).

CONTRIBUTION OF TEACHER EDUCATORS

The teacher educators have much to contribute to the development of quality amongst the teachers. It is high time that they understand their role rather than simply criticize the system in the name of NCTE. If they do not contribute, they will move from the current marginalized status to the one of irrelevance. They will have to respond at both conceptual/empirical and pedagogical levels (Liston et.al. 2008).

The first and foremost thing is that they will have to accept the existing realities of the world. Privatization has entered educational system and they cannot deny it at any cost. A large number of men and women aspire to get degree or diplomas in teacher education to join teaching or jobs similar to teaching. The existing teacher education colleges or the University departments of education cannot accommodate all the aspirants. The nation at such a juncture will have to depend on private participation in education system of the country.

Further the Mass Education does not Necessarily Mean the End of Quality. Simply harping on the tune of deterioration of standards due to the gap in demand and supply will not serve any purpose. Teacher education programme in India has never been based on demand and supply phenomenon. There has always been a good number of participants who never joined teaching after earning a degree or diploma in education. It has generally been observed that objective of many women in getting admission to teacher education programme has been to earn a certificate for future employment. Many women join teaching even after a decade of getting professional degree in wake of their personal or family

problems. In such a situation there is a need to draft teacher education courses that have totally specialized knowledge, specialized skills and inherent code of ethics. It can be done by having good theoretical base. Instead of depending on Philosophy, psychology or such other subjects they should bring up a body of knowledge that the future teachers start philosophizing or thinking psychologically to find solution to their classroom problems. Also the teacher educators should start devising the knowledge akin to the discipline of education. For example over the years the education has developed its own vocabulary like learning styles, thinking skills, *etc.*

Secondly, the teacher educators will have to delve on specialized skills that add quality to the professional functioning. Such skills mean having hard, technical expertise along with softer interpersonal capabilities. Skills of quality teaching and quality assessment are most desired. Quality teaching skills involve the process of making students work hard and become independent learner. For example posing a problem before the learners and helping them find solutions to these problems is a skill and such skills need to be developed in the teacher trainees. Similarly the teacher trainees have to be trained in quality assessment procedure. This type of assessment requires the trainees to assess the students with respect to their thinking process and learning styles. In the same manner, the skills related to feed back have to be developed amongst future teachers so that the feedback is accepted open mindedly by the students and they improve upon.

Thirdly teacher educators should envision functions other than teaching by making teacher education degree/diploma broad based with respect to changing times. Many dimensions with specializations will have to be added since the future teaching will not be limited to classroom teaching alone. Students will not depend upon teachers to seek knowledge about subject matter. They will be finding better transmitter of knowledge in media. However, they will not be able to negate the teachers.

They will require help of the teachers to solve their day-to-day learning or behavioural problems. The students who will not be able to have access to schools will look for teachers get self learning material to suit their learning styles. Not only students, even the parents of the students will seek indulgence of teachers in achieving their aspired goals. Above all the future schools will be having trauma centres on their campus and will depend upon teachers' skills to solve various issues related to behavioural problems of students. All such issues cannot be ignored by the teacher education programme if it has to suit the demands of the society. Therefore teacher educators will have to design course curricula to accommodate such functions of the teachers. Specializations like Public Relationing, Parent Counselling, Behavioural Therapy, Developing e-learning material, *etc.*, will have to be included in the course curricula of teacher education. All such dimensions have to be added to the teacher education courses if these courses have to exist in the future. Otherwise there is very likelihood that these courses will loose their credibility to the global societal needs.

Fourthly, the whole nature and process of teacher education will have to be worked out differently. Existing teacher education programme is divided in to different academic papers and sections. Usually the academic papers are Principles of Education and Educational Psychology, *etc.* While teaching these courses, the teacher educators emphasize information aspect only (having no relevance to classroom teaching or school problems). The student teachers are never taught 'how to use the information for solving problems related to school education in general and teaching in particular'. Keeping in view the limitations of discipline oriented approach the teacher educators should visualize Problem oriented approach. A comprehensive list of various problems faced by various functionaries be developed through field based working. The student teachers should be asked to find out workable solutions to the problems. The purpose of teacher education should be development of problem solving skills rather than imparting knowledge alone. This is possible by having flexible, experience based, process oriented teacher education programme; wherein the student teachers are trained in analysing the problem, developing hypotheses, collecting relevant data and drawing conclusions. Later the student teachers discuss these conclusions with large group to work on the solutions in simulated set up. Such a Project based teacher education programme will help in establishing credibility of teacher education programme. Let the apex institution like NCTE work with a vision to metamorphose the existing teacher education programme.

Fifthly, the teacher educators will have to organize their research as per the needs of the society and the market forces. Liston et.al. (2008) in his editorial pointed out that "Teacher quality research emerges from different conceptual lenses, some less familiar to educators (*e.g.*, labour economies). It is important to grasp varied theories of action implied and to analyse assumptions and values in different research designs." To put it in simpler words, it connotes that research process and research problems in education should be such that these solve societal problems from different angles. For example the society in India at present is being faced with problems like violence by schools students, sex linked problems at primary stage, aspiration of parents that their child should lead the class in every activity, going for tuitions even at pre-primary level, *etc.* The answer to such problems is not simple. It involves knowledge of sociology, psychology as well as economics. The teacher educators need to get all essential knowledge to take up the issue and find workable solutions. After all it is the teacher educators who teach about the nature of the child and work directly in the field.

TEACHING STRATEGIES

Institutions of higher learning across the nation are responding to political, economic, social and technological pressures to be more responsive to students' needs and more concerned about how well students are prepared to assume future societal roles. Faculty are already feeling the pressure to lecture less, to make learning environments more interactive, to integrate technology into the learning experience, and to use collaborative learning strategies when appropriate.

Some of the more prominent strategies are outlined below. For more information about the use of these and other pedagogical approaches, contact the Programme in Support of Teaching and Learning.

Lecture. For many years, the lecture method was the most widely used instructional strategy in college classrooms. Nearly 80% of all U.S., college classrooms in the late 1970s reported using some form of the lecture method to teach students. Although the usefulness of other teaching strategies is being widely examined today, the lecture still remains an important way to communicate information.

Used in conjunction with active learning teaching strategies, the traditional lecture can be an effective way to achieve instructional goals. The advantages of the lecture approach are that it provides a way to communicate a large amount of information to many listeners, maximizes instructor control and is non-threatening to students. The disadvantages are that lecturing minimizes feedback from students, assumes an unrealistic level of student understanding and comprehension, and often disengages students from the learning process causing information to be quickly forgotten.

The following recommendations can help make the lecture approach more effective:
1. Fit the lecture to the audience
2. Focus your topic-remember you cannot cover everything in one lecture
3. Prepare an outline that includes 5-9 major points you want to cover in one lecture
4. Organize your points for clarity
5. Select appropriate examples or illustrations
6. Present more than one side of an issue and be sensitive to other perspectives
7. Repeat points when necessary
8. Be aware of your audience-notice their feedback
9. Be enthusiastic-you don't have to be an entertainer but you should be excited by your topic.

Case Method. Providing an opportunity for students to apply what they learn in the classroom to real-life experiences has proven to be an effective way of both disseminating and integrating knowledge. The case method is an instructional strategy that engages students in active discussion about issues and problems inherent in practical application. It can highlight fundamental dilemmas or critical issues and provide a format for role playing ambiguous or controversial scenarios.

Course content cases can come from a variety of sources. Many faculty have transformed current events or problems reported through print or broadcast media into critical learning experiences that illuminate the complexity of finding solutions to critical social problems. The case study approach works well in cooperative learning or role playing environments to stimulate critical thinking and awareness of multiple perspectives.

Discussion. There are a variety of ways to stimulate discussion. For example, some faculty begin a lesson with a whole group discussion to refresh students'

memories about the assigned reading(s). Other faculty find it helpful to have students list critical points or emerging issues, or generate a set of questions stemming from the assigned reading(s). These strategies can also be used to help focus large and small group discussions.

Obviously, a successful class discussion involves planning on the part of the instructor and preparation on the part of the students. Instructors should communicate this commitment to the students on the first day of class by clearly articulating course expectations. Just as the instructor carefully plans the learning experience, the students must comprehend the assigned reading and show up for class on time, ready to learn.

Active Learning. Meyers and Jones (1993) define active learning as learning environments that allow "students to talk and listen, read, write, and reflect as they approach course content through problem-solving exercises, informal small groups, simulations, case studies, role playing, and other activities — all of which require students to apply what they are learning" (p. xi). Many studies show that learning is enhanced when students become actively involved in the learning process. Instructional strategies that engage students in the learning process stimulate critical thinking and a greater awareness of other perspectives. Although there are times when lecturing is the most appropriate method for disseminating information, current thinking in college teaching and learning suggests that the use of a variety of instructional strategies can positively enhance student learning. Obviously, teaching strategies should be carefully matched to the teaching objectives of a particular lesson. For more information about teaching strategies.

Assessing or grading students' contributions in active learning environments is somewhat problematic. It is extremely important that the course syllabus explicitly outlines the evaluation criteria for each assignment whether individual or group. Students need and want to know what is expected of them. For more information about grading, see the Evaluating Student Work section contained in this Guide.

Cooperative Learning. Cooperative Learning is a systematic pedagogical strategy that encourages small groups of students to work together for the achievement of a common goal. The term 'Collaborative Learning' is often used as a synonym for cooperative learning when, in fact, it is a separate strategy that encompasses a broader range of group interactions such as developing learning communities, stimulating student/faculty discussions, and encouraging electronic exchanges. Both approaches stress the importance of faculty and student involvement in the learning process.

When integrating cooperative or collaborative learning strategies into a course, careful planning and preparation are essential. Understanding how to form groups, ensure positive interdependence, maintain individual accountability, resolve group conflict, develop appropriate assignments and grading criteria, and manage active learning environments are critical to the achievement of a successful cooperative learning experience. Before you begin,

you may want to consult several helpful resources. In addition, the Programme in Support of Teaching and Learning can provide faculty with supplementary information and helpful techniques for using cooperative learning or collaborative learning in college classrooms.

Integrating Technology. Today, educators realize that computer literacy is an important part of a student's education. Integrating technology into a course curriculum when appropriate is proving to be valuable for enhancing and extending the learning experience for faculty and students.

Many faculty have found electronic mail to be a useful way to promote student/student or faculty/student communication between class meetings. Others use listserves or on-line notes to extend topic discussions and explore critical issues with students and colleagues, or discipline-specific software to increase student understanding of difficult concepts.

Currently, our students come to us with varying degrees of computer literacy. Faculty who use technology regularly often find it necessary to provide some basic skill level instruction during the first week of class. In the future, we expect that need to decline. For help in integrating technology into a course curriculum contact the Programme in Support of Teaching and Learning or the Instructional Development Office (IDO) at 703-993-3141. In addition, watch for information throughout the year about workshops and faculty conversations on the integration of technology, teaching and learning.

Distance Learning. Distance learning is not a new concept. We have all experienced learning outside of a structured classroom setting through television, correspondence courses, *etc*. Distance learning or distance education as a teaching pedagogy, however, is an important topic of discussion on college campuses today. Distance learning is defined as 'any form of teaching and learning in which the teacher and learner are not in the same place at the same time'.

Obviously, information technology has broadened our concept of the learning environment. It has made it possible for learning experiences to be extended beyond the confines of the traditional classroom. Distance learning technologies take many forms such as computer simulations, interactive collaboration/ discussion, and the creation of virtual learning environments connecting regions or nations. Components of distance learning such as email, listserves, and interactive software have also been useful additions to the educational setting.

THE CHARACTERISTICS AND DEMANDS OF TEACHING PROFESSION

Paradoxically, following the 86th Amendment of the Constitution which makes it mandatory for the State (government) to provide free and compulsory education to all children in the six-14 age group, and national rollout of the Sarva Shiksha Abhiyaan (Education for All) programme, never before has teachers' morale been so critical to national development in this country blessed or cursed — informed opinion is divided — with the world's largest child

population (415 million). Unfortunately the rising tide of teacher discontent and disaffection is swelling at a time when an unprecedented shortage of teachers is manifesting across the country. Suddenly as government and private schools, colleges and universities are confronted with an unprecedented teacher shortage, alarm bells are ringing in Indian academia, even if not in the sleepy warrens of the education ministries in New Delhi and the state capitals. In Karnataka, 23,000 teaching posts in government primary and high schools are vacant; in benighted Bihar, teacher vacancies number 2.3 lakh. The Unesco Institute of Statistics in its report Teachers and Educational Quality: Monitoring Global Needs for 2015 released in June, says that to meet the Millennium Development Goal of providing elementary education to all children by 2015, "India will need the greatest inflow of new teachers in the world — more than 2 million".

It's an indicator of the depth of the growing teacher shortage slowly overtaking India that the bourgeoning private schools sector, which hitherto attracted a perennial supply of best and brightest teachers, is also experiencing a faculty crunch. According to www.schooljobs.in, India's pioneer online teacher recruitment portal, 500 vacancies have been notified by private schools during the past three months. Moreover the appointments pages of national newspapers are increasingly attracting teacher recruitment advertisements with one school sometimes advertising for 15-20 teachers. Gone are the days of principals of top schools such as Bishop Cotton, Bangalore, Doon School and Delhi Public School boasting about piles of unsolicited job applications from highly experienced teachers on their desks. Today, for the first time ever, jobs are chasing teachers, rather than the other way round.

"Though government schools always had the problem of unfilled teacher vacancies because of budgetary problems, it's perhaps for the first time that private schools are confronted with an acute teacher shortage. This is largely because post-liberalisation, with the huge demand for people in the IT and BPO (business process outsourcing) sector, the number of young people entering the teaching profession has decreased dramatically. Moreover post 1991, India has witnessed a sharp uptrend in the promotion of private schools. These institutions which specifically cater to the aspirations of the country's growing middle class are mushrooming at a fast rate and have created an unprecedented demand surge for well-qualified teachers. But while the demand for teachers has shot up, supply has declined. According to a research, India needs 800,000 new teachers every year for the next three years if it's to make up the shortfall and cater to new student enrollments.

Indeed mushrooming private schools across the price spectrum is arguably the single most important factor contributing to the national teacher shortage crisis. Academic estimates indicate that the number of private schools in India has leapt from 50,000 in 1996 to 77,140 in 2006. In this meteoric growth trajectory, the rash of five-star 'international' schools springing up countrywide has attracted great public and media attention (India currently boasts over 100 international schools). Though these highly capital-intensive schools — which offer sprawling playing fields and sports facilities, wired classrooms, five-star

residential accommodation and cuisine, and affiliations with the best national and international examination boards at annual tuition fees ranging from Rs.1-6 lakh — offer much better pay packets and working conditions to teachers than traditionally top-ranked CBSE and CISCE affiliated private schools, they too are encountering considerable difficulty in recruiting and retaining qualified teachers. The groves of academia are buzzing with stories of 'body snatching' of teachers by international schools — particularly principals' — emoluments beginning to match corporate salaries.

According to Anu Monga, principal of Bangalore International School (no. of teachers: 60; student enrolment: 250) and chairperson of the The Association of International Schools of India (TAISI). "International schools countrywide are experiencing a scarcity of competent teachers. Since international curriculums demand highly qualified and well-trained faculty, it's becoming increasingly difficult for schools to deliver internationally acceptable education without talented and committed teachers. We are aware of the unethical ways in which some international school managements are luring teachers from competitor schools. Therefore TAISI has decided to evolve a code of conduct for members with regard to recruiting teachers from member schools. But if international schools want to really reduce teacher attrition they must pay greater attention to continuous teacher training and development. Their focus has to be on motivating and retaining young professionals as teachers."

Although emerging teacher body snatching wars and unprecedented pay packages for the competent have prompted much head shaking and tuttutting among leftists and traditional academics, the entry of internationally benchmarked schools into the education sector has served the useful purpose of endowing the teaching profession with new social respectability. By awarding teachers superior working conditions, opportunities to use creative teaching methodologies, uncrowded classrooms, continuous teacher development programmes and most important, pay packets ranging from Rs.20,000-50,000 per month, the country's 100-plus international schools have made teaching a more attractive and profitable profession. And encouragingly there's a distinct possibility that the most idealistic — even if not the best and brightest — graduates of the country's 344 universities and 17,700 colleges may re-evaluate teaching as a career.

Promoters of the rash of five-star international schools offering leisure-resort style, landscaped, fully-wired campuses bristling with hi-tech equipment and teaching aids, have been brought down to earth with the growing awareness that the unique selling proposition of high-end academic institutions is excellent faculty, rather than luxurious infrastructure. Pressure from upmarket parents paying chastening fees of Rs.1-6 lakh per year upon managements to make good their promise of delivering a 21st century international education is beginning to tell. Consequently, faculty raids popularly known as body snatching have become de rigueur within the esoteric world of India's estimated 100 international and 9,500 upscale private schools. The rapid turnover of teachers in international schools is particularly painful for their high networth promoters

as teacher training for international school curriculums —IGCSE and/or the International Baccalaureate diploma — is very expensive. For instance the IB teacher-training programme averages Rs.25,000 per teacher and IGCSE Rs.15,000. Therefore the flight of a trained teacher is an expensive loss.

Yet better pay packets apart, a contributory cause of accelerated teacher migration from the new genre of capital-intensive five-star schools is the authoritarian command-control management style of first generation school promoters, usually businessmen-turned educationists. "This new generation of promoters not only lacks institutional management and teaching experience, they also tend to be too hands-on and interfere in everything from curriculum development, extra-curricular activities to classroom teaching styles. Experienced teachers and principals with numerous job options can't stomach this," says a Mumbai-based education consultant.

This newly emergent friction between promoters and high-profile headmasters is exemplified by the recent career graph of Dev Lahiri, former headmaster of Lawrence School, Lovedale. Following his exit from Lawrence Lovedale reportedly for refusing to toe the line of former Union HRD minister Dr. Murali Manohar Joshi, Lahiri was appointed the first principal of the upscale Selaqui School, Dehra Dun in 2003, which he quit, complaining about the ubiquitous presence of promoter Om Pathak on the school campus. The same year he signed up as principal of Kolkata's The Heritage School, which he quit again pleading irreconcilable differences with the promoter. Currently Lahiri is headmaster of the tried and tested 69-year-old Welham Boys School, Dehra Dun.

Certainly within the hitherto socially under-rated teachers community there is rising enthusiasm about the new developments in school education. Bangalore-based Preeti Vincent, a maths teacher who resigned from the Indus International School in 2004 to sign up with Bangalore International School, confirms that the emergence of international schools has changed the popular perception that teaching is a low-skills profession. Moreover it has given India's long-neglected teachers community a booster shot of new hope and excitement. "International schools value and recognise competent teachers, offer the best remuneration in the market and pay great attention to continuous teacher development and training with some of them even sending teachers abroad for training. However although the new international schools have redefined the role of teachers, very few involve them in curriculum development and decision making. Doing so is vital to motivating and retaining them.

Inevitably the prime target group of international schools and head hunting firms are under-paid teachers in the country's 8,097 CBSE and 1,502 CISCE affiliated schools. Given that even in the most highly-rated English medium schools, annual remuneration packages average a modest Rs.80,000-120,000, teachers from these schools are flocking to international schools where twice this pay is common. This teacher exodus to five-star schools has forced CISCE and CBSE schools to raise pay and incentives to retain their most experienced faculty who are being targeted — often harassed — for recruitment.

But if despite substantially improved pay packages and service conditions, private schools in India are experiencing an accelerating teacher shortage, this is a global phenomenon. Most western countries, especially the US and UK, are also reporting rising teacher vacancies — particularly of maths, science and English teachers. In the US there are an estimated 22,000 vacancies for school teachers. Therefore the emerging teacher crisis in private schools in India is also connected with intensifying recruitment of private school (government school teachers are an altogether different genre) teachers by school managements and local governments in these countries. Currently there are over 25,000 secondary school teachers from India abroad.

The emerging shortage of teachers is not peculiar to upmarket independent schools. Even schools at the bottom of the private education pyramid are complaining of teachers being lured away by the BPO industry and other sectors of the economy. These mostly English-medium unaided schools which comprise the largest group in the private school sector catering to children from lower middle class families, are affiliated with state examination boards and charge annual tuition fees ranging between Rs.5,000-10,000. Since they keep tuition fees low and affordable, teacher salaries are abysmal by 21st century standards — typically between Rs.3,000-5,000 per month. The BPO industry, which is growing at 56 percent every year and offers start-up monthly remuneration of Rs.10,000-15,000, has been quick to discern this unhappiness over pay and working

Yet if private schools are experiencing teacher shortages for the first time in post-independence India for demand-pull reasons, their problems — and ability to resolve them — pale into insignificance when compared with faculty shortages in the country's estimated 1,000,000 government-run primary and secondary schools. By a curious and typically Indian anomaly, government school teachers enjoy 30-50 percent higher pay than private school teachers. But even with teachers' pay pegged at above market price, for years the country's Central and state governments which are running huge fiscal deficits have neglected to appoint additional teachers. Consequently most of the 31 states of the Indian Union have thousands of teacher vacancies in government schools. In Uttar Pradesh 61,437 teachers' posts are vacant, in Karnataka 13,500 new teachers need to be appointed, while in Bihar there's a massive deficit of 2.3 lakh teachers.

Fortunately because of public pressure to meet the target of the Sarva Shiksha Abhiyaan (Education for All campaign) which was launched in 2001 and followed by the Right to Education Bill, 2006 that guarantees free education to every child between six and 14 years, state governments have been compelled to make provision for recruiting new.

Yet perhaps the most disturbing fallout of the creeping teacher shortage nationwide is crowded classrooms and single teacher schools. India already boasts one of the highest teacher pupil ratios in the world: 1:60 (according to World Bank data) and over 200,000 government schools have only one teacher who conducts multigrade classes simultaneously. Consequently poor learning outcomes which is a defining characteristic of Indian education is certain to

remain an unresolved problem. "In some states like Bihar and Uttar Pradesh the teacher-pupil ratio is 1:62. To halve this ratio or at least reduce it to a more manageable 1:40, we need to aggressively recruit teachers. While para teachers are good as a stopgap arrangement, they should be replaced by regular well-trained teachers.

Against this backdrop of the bewildering mess which has been made of the chronically under-provided education system, it's hardly surprising that India's youth are reluctant to enter the teaching profession — synonymous with shabby, crowded classrooms; dilapidated infrastructure (toilets, water, libraries, laboratories), unsympathetic parents and lack of social respect. "Regrettably teaching no longer attracts committed and talented young people. It's right at the bottom in the hierarchy of professions. If we want to attract talented youth into the profession, teaching needs a complete makeover. It has to be repackaged as a stimulating, interesting and well-paying profession. You can't pay a teacher as much as you pay your domestic help and hope to provide quality education.

Yet at bottom, India's pernicious teacher shortage crisis is a problem of quality, rather than quantity. The country's estimated 20,000 teacher training institutions (including government and private sector Montessori, D.Ed, B.Ed and M.Ed colleges) which churn out 300,000 teaching graduates every year, are lumbered with outdated curriculums delivered by de-motivated faculty. "In terms of the number of B.Ed postgraduates, India has a sufficient annual output. But how many of them are sufficiently trained to be effective in their classrooms, is the moot point. Ninety percent of B.Ed postgrads are under-qualified and need further training before they can be allowed to handle classes independently.

The upshot of all this is that in the final analysis, with the 86th Amendment to the Constitution having endowed all of India's estimated 375 million children aged six to 14 years free and compulsory education, the Central and state governments have no option but to re-order their spending priorities and raise their combined annual education outlay from the current 3.5 percent of GDP to 6 percent as was presciently recommended by the Kothari Commission in 1966. Even as post-independence India's establishment stands indecisive at a historic crossroads in the new millennium, the education system is in the throes of an unprecedented crisis characterised by enormous teacher shortages, crumbling institutional infrastructure and deplorable learning outcomes. If a radical re-ordering of national spending priorities is not undertaken expeditiously, India's much-trumpeted demographic dividend could soon morph into a demographic disaster.

INSTRUCTIONAL STRATEGIES FOR TEACHING AT A DISTANCE

For both face-to-face and online education, student contact with the instructor, both in and out of class, appears to be a crucial factor in student motivation and persistence. As the instructor, you establish the tone for the course and communicate your expectations primarily through text. A supportive and inviting tone is important, conveying accessibility and concern for student success.

Techniques:
- Create a "Welcome to the Class" message. You can use text, text and audio, and text and video. Showcase your passion for the content and provide information on how to get started in the course.
- Use Announcements to deliver general course information to all students on a regular basis.
- Carefully define how you want students to communicate with you. Stating a preferred communication method and a secondary method of contact reduces anxiety.
- Define the expected response time for return messages from you. Be sure to let students know that you do not monitor email or the discussion board 24/7 and that there are hours when they should not expect a response from you. If you do not work on weekends or holidays, include this information as well.
- Post clear expectations of time demands for students.
- Indicate the due date for each posting, assignment, and assessment.
- Create models of exemplary and poor posts so student understand your expectations
- Personalize email and other communications so students feel you care about them as individuals.
- Require students to introduce themselves to the class.
- Create Forums in the Discussion Board for technical issues, students-helping-students, and a social area for off-topic discussions.
- Plan for specific communications between you and each student, you and small groups, and you and the class.
- Use feedback to gather information on your teaching and on student learning so you can adjust instruction.
- Define, in clear terms, the required levels of student participation in the course.

TYPES OF EVALUATION

Evaluation can be either formative, summative, or a combination of both.
Formative evaluation:
- Is an on-going process to be considered at all stages of instruction.
- Will enable the instructor to improve the course as he/she proceeds.
- Facilitates course and content adaptation.
- Will identify major gaps in the instructional plan or the need for minor adjustments.

Some strategies that educators can use to collect formative data from their distant students include:
- Post cards-provide each student with pre stamped and preaddressed postcards. On a weekly basis, have students use the postcards to share their concerns or respond to questions during the last three to five minutes of class.

- Electronic mail-Can be a very effective way for instructors and students to communicate. Another plus, while the instructor is eliciting information about classroom learning, students become familiar with the use of electronic mail, a valuable skill.
- Telephone-Call students often. Ask them open ended questions (*e.g.*, "What snags did you run into on the second writing assignment?") to let students voice their concerns. Follow with probes (*e.g.*, "Then, will you need more information sources?"). Set phone-in office hours but be sure to welcome calls at other times.

Summative evaluation:
- Assesses overall effectiveness of the finished product or course.
- Can be a springboard in developing a revision plan.
- Can be a baseline of information for designing a new plan, programme, or course.
- Will not help current students since it is conducted upon course completion.

Some questions that educators may want to ask students when collecting summative data include:
- List five weaknesses of the course.
- List three (or five) strengths of the course.
- If you were teaching the course, what would you do differently?
- Student background information: age, level in school, number of distance delivered courses taken prior to this one.
- What would you recommend to a friend planning to take this course?
- What did you think would be covered in this course but was not?
- Would you recommend this course to a friend? Why or why not?

EVALUATION METHODS

Within the context of formative and summative evaluation, data may be collected through quantitative and qualitative methods.

Quantitative evaluation:
- Involves asking questions which can be statistically tabulated and analyzed, frequently using a scale, check list, or yes/no responses.
- Limits students to responding to the categories made available to them.
- Needs a large student sample for relevant statistical analyses.

Quantitative methods may be most useful for gathering information on large numbers of respondents for whom more in-depth, personalized approaches are not feasible. However, they do have some significant drawbacks:
- Many distance education courses have relatively small class sizes with students from various backgrounds. These small, stratified populations typically defy relevant statistical analysis.
- Quantitative surveys typically result in a rate of return of under 50 percent. A low rate of return often suggests that only those feeling very positively or negatively about the course responded to the evaluation.

- By definition and design, forced choice surveys offer respondents a limited number of possible response options. Therefore, fresh insights and unique perspectives falling outside the provided response categories go unreported.
- The cumbersome and often tedious nature of quantitative data collection can discourage formative evaluation, and often results in an over-reliance on summative evaluation.
- Statistical analysis often results in an illusion of precision that may be far from reality.

Qualitative evaluation:
- Is typically more subjective.
- Involves gathering a wider range and depth of information.
- Is more difficult to tabulate into neat categories.
- Will be less affected by typical small class size.
- Is a more flexible and dynamic method.
- Is not limited to pre-conceived topic of inquiry.
- Allows for student output of topics.

Can use:
- *Open ended questioning:* With respondents asked to identify course strengths and weaknesses, suggest changes, explore attitudes towards distance delivery methods, *etc.*.
- *Participant observation:* With the distance educator observing group dynamics and behaviour while participating in the class as an observer, asking occasional questions, and seeking insights regarding the process of distance education.
- *Non-participant observation:* With the distance educator observing a course (*e.g.*, an audio conference, interactive television class, *etc.*.) without actually participating or asking questions.
- *Content analysis:* With the evaluator using predetermined criteria to review course documents including the syllabus and instructional materials as well as student assignments and course-related planning documents.
- *Interviews:* With a facilitator or specially trained individual collecting evaluative data through one-on-one and small-group interviews with students.

WHAT TO EVALUATE

Consider the following areas:
- Use of technology-familiarity, concerns, problems, positive aspects, attitude towards technology.
- Class formats-effectiveness of lecture, discussion, question and answer; quality of questions or problems raised in class; encouragement given students to express themselves.
- Class atmosphere-conduciveness to student learning.

- Quantity and quality of interaction with other students and with instructor.
- Course content-relevancy, adequate body of knowledge, organization.
- Assignments-usefulness, degree of difficulty and time required, timeliness of feedback, readability level of print materials.
- Tests-frequency, relevancy, sufficient review, difficulty, feedback.
- Support services-facilitator, technology, library services, instructor availability.
- Student achievement-adequacy, appropriateness, timeliness, student involvement.
- Student attitude-attendance, assignments submitted, class participation.
- Instructor-contribution as discussion leader, effectiveness, organization, preparation, enthusiasm, openness to student views.

EVALUATION TIPS

- Check out and adapt already published questionnaires; there's no need to re-invent the wheel.
- Draft and revise questions; change if necessary.
- Make use of follow-up probes:
- Alternate between instruction and interaction.
- Sequence your questions for best effect-go ahead and ask for suggestions for improvement before asking for what is good. This will help convey sincerity for seeking improvements.
- Place open ended questions after quick answer questions. This gives students built-in thinking time.
- On summative evaluation, assure anonymity. This can be accomplished by having all questionnaires sent to a neutral site where they would be removed from their envelopes and forwarded to the instructor without a postmark.
- Establish rapport by being interested and supportive. Withhold judgmental responses.
- Adapt to the student in degree of formality and pace of communication.<
- Use evaluation as a method for understanding teaching and learning.
- Try to get both positive and negative feedback. It is important not only to know what is not working, but also what is working.

INSTRUCTION AND LEARNER SUPPORT

The issue of learner support has received wide attention in distance education. The research, however, has been varied and inconclusive. After examining one hundred seven articles to determine whether there were predictors of successful student support, Dillon and Blanchard (1991) conclude that the reported research was mixed. They propose a model to examine the support needs of the distance student, related to institutional characteristics, course content and the technology.

In a study analyzing learner support services in a state-wide distance education system, Dillon, Gunawardena and Parker (1992) outline the function and effectiveness of one learner support system and make recommendations for examining student-programme interactions. Feasley (1991) comments that although research on student support falls largely into the evaluation category, there are some very useful case studies and institutional surveys such as reports issued by Fern Universitat, National Home Study Council which summarize statistics about student services for a number of institutions.

Wright (1991) comments that the largest number of studies related to student support have been conducted outside the United States with large distance education programmes. The student support activities reported are: pre-enrollment activities, tutorial services as well as counselling and advising services. In addition to student support, several ethical and administrative issues related to students are repeated in the current literature as well. The mediation of technology coupled with the distance between instructor and student poses questions related to admission, counselling and retention.

Reed & Sork (1990) provide evidence that admission criteria and intake systems should take into account the unique demands of the adult learner (*i.e.*. motivation, anxiety, interactions and learning style). Nelson (1988) states that admission requirements should consider the effects of the individual's cognitive styles as these often affect student achievement in programmes characterized by mediated communications and limited personal contact. Combined with the institutions' responsibilities related to admissions procedures is the responsibility of counselling students into and out of programmes where the learner and advisor are physically separated (Reed & Sork, 1990). Herein two issues arise. First, the nearly impossible task of understanding the life situation of the learner when distance and time interfere with communication, makes counselling a difficult task at best. Second, the monetary requirements of the distance education institution and the well-being of the student who may or may not be advised into a distance education environment must be considered. Reed & Sork (1990) observe that students counseled out of distance education represent a loss of revenue. Counselling in a traditional setting requires expertise in a number of psychological and academic areas. However, counselling from a distance is a highly complex process which calls for a variety of methods, materials, and a knowledge of adult learner characteristics (Verduin & Clark, 1991). The recent literature has offered various profiles of the distance education student. Counselling professionals should review the research on student needs and develop new methodologies for assisting students at a distance. Additional research is called for in all areas of student interaction with the learning environment.

5

Steps for Developing Self Instructional Materials

Associationism

Aptly named, Associationism is a theory about how items combine in the mind to produce thought and learning. Not only are a great many of histories great minds associated with associationism, such as John Locke, George Berkeley, David Hume, and John Stuart Mill, to name a few, but the theory was also to give rise to behaviourism. The basic tenants of Associationism are quite easy to understand: items are associated in the mind through experience. These items are derived from experience, and combine to form thought. For example, a small child learns not to touch a fire because that child associates the fire with pain, the pain coming from past experience. Each item can combine with other items to form a more complex idea. A good analogy is that of a sentence. Each word in a sentence is represents an item; the words are combined to form ideas and thought, the sentence. An infinite number of sentences can be formed by rearranging the words.

There are four typical principles of associationism, and three main processes. The principles state that items that are contiguous in time or space are lined by association, that items that are similar are linked by association, that items that contrast are linked and that items that have a cause/effect relationship are also linked. These linkings all occur through the three processes of sequencing, compounding and decomposition King. Sequencing refers to a type of chronological pattern, where as compounding refer to the building up and breaking down of items, respectively.

Associationism can be traced all the way back to Aristotle, who believed it was "common sense" that different aspects of an object combined together to become the idea of the object. For example, the colour, taste, feel and smell of an apple combined together to become the idea of an apple (Boeree, 2000). After Aristotle, associationism fell out of common philosophy as it was considered a basic description of every day events. However, John Locke and David Hume began to revive associationism. Locke argued that there were not innate ideas, only ideas that were dependent on association of sensations. Hume reinforced the ideas of resemblance, contiguity and cause and effect. John Stuart Mill, the most famous proponent of associationism, later expanded these procedures. Associationism is seen as the beginning of cognitive psychology, and began to explain the existences of a conscious and of altruistic motives. Associationism paired experience to create thought and learning. Learning was seen as the formation of associations between unrelated information based on their contiguity. Importantly, the sum (thought) can be created without conscious memory of the individual parts.

Although associationism gave way to behaviourism, remnants of associationism can still be seen in psychology as well as learning. The famous ink-blot tests use associationism to help understand other underlying psychological issues. Most of us have used association techniques to remember an address or a friend's birthday, or the answers to a test question. The possible educational benefits of successfully incorporating associationism into instructional technology are great. In fact, it would be difficult to image learning some aspect of technology without it building on and being associated with a former.

Behaviourism

Most of us these days would like to believe that a theory of learning like behaviourism doesn't exist, that it is a long-gone theory only existing in the mind of a few out of touch psychologists. In fact, most of us cringe at the thought that humans could, and perhaps do, learn and behave like dogs, rats and pigeons, that we salivate at the thought of food, or that we are a product of a biology that we cannot purge. Most of use would, however be more comfortable with behaviourism if we understood it better.

Essentially, behaviourism is the idea of stimulus-response, that if X occurs, Y will follow. We live our lives every day with this principle and do hundreds of things based on the stimulus-response model. If I touch fire, it will hurt, so I pull my hand away; hit my knee with a small hammer, and it will jerk. It is simple enough. Carried further, we can achieve a conditioned response, where we have learned to have a response. If the light turns red, then I stop my car. And, carried yet further, if there is a stimulus, I will have a response, and if I am reinforced for having that response, the frequency of that response will be reinforced.

Ivan Pavlov's work with his dog and classic conditioning, the idea that you could condition a reflex, signalled the beginning of behaviourism. He found

that he could give food to a dog and it would salivate, ring a bell instead of giving food and the dog would salivate as well. The stimulus, food, generated a response, but the response could be conditioned as well. John Watson, a colourful character who had trouble with his love life and his professional career, continued in this vane and was really the first to put behaviourism into the American vocabulary. His experimental subjects were not dogs, but rats, whom he trained to do real-life learning tasks for food rewards (behaviorism.html). He believed that mental concepts had little or no impact on behaviour. Because of career missteps, Watson wrote mainly from a layperson's perspective, but managed to apply his theories of behaviourism to everyday issues such as advertising. He is, however, referred to as the father of behaviourism.

B.F. Skinner, on the other hand, took behaviourism one step further with his experiments on reinforcement. He believed that behaviourism was not all about reflexes; rather, reinforcement of a response was responsible for learning. This is called operant conditioning. Skinner believed that both positive and negative reinforcement existed, and that behaviour could be shaped until it approximated the target behaviour. He later applied this theory to learning. Behaviorist theories of learning are, "... relatively simple to understand because it relies only on observable behaviour and describes several universal laws of behaviour. Its positive and negative reinforcement techniques can be very effective—both in animals, and in treatments for human disorders such as autism and antisocial behaviour. Behaviourism often is used by teachers, who reward or punish student behaviours," (Funderstanding, 2002)

Obviously, there are many criticisms of behaviourism. The theory cannot account for all kinds of learning, nor can it explain some learning. Additionally, the human idea of free will and responsibility for actions is lost. "The central tenet of behaviourism is that thoughts, feelings, and intentions, mental processes all, do not determine what we do. Our behaviour is the product of our conditioning. We are biological machines and do not consciously act; rather we react to stimuli," (Cohen, 1987).

Instructional technology has had a long partnership with behaviourism. Skinner was one of the first to apply his theories of behaviourism to instruction with his teaching machine, a machine that rewarded the learner every time a correct answer was given. This teaching machine later grew into Programmed Instruction, and is still a part of many of today's computer assisted learning, particularly in the filed of language learning.

Information Processing

Most of us understand the difference between short-term and long-term memory, but few us understand how the two work, independently or together, and even fewer of us understand how these two functions can impact learning. The Information Processing Approach can help answer these questions.

Information Processing theory, put forth by George A. Miller, compares the human brain to a computer. The brain is given input through sensory functions

(sight, hearing, smell and touch). The brain takes this information and transforms it into a different form, and then performs operations, but reacting to or storing the information. The idea of learning comes from understand how the information is stored.

Short-term memory is sometimes referred to as working memory. It is that which is easily recallable, and easily forgotten. The average time a bit of information is held in short-term memory is 15 to 20 seconds. After that, the information is either transferred to long-term memory or forgotten.

Long-term memory can be compared to computer disks, where the data is held until needed. Some information is held and never recalled, while other information may be needed but recalled with difficulty. According to Huitt, long-term memory stores the information in three basic structures. These structures are Semantic Memory, which holds concepts, principles, rules, facts and generalized information; Procedural Memory, which stores the "how to" information like driving a car; and Imagery, which stores pictures (2000).

There are a few basic concepts to understanding information processing. The first is that short-term memory is limited to, as Miller claims, seven "chunks" of information. Any more than seven and the information cannot stay in short term memory (it may be no coincidence that telephone numbers have seven digits). Another basic principle is that behaviour is that processing information in sequence is fundamental to the cognitive process, what Miller calls TOTE (Test-Operate-Test-Exit).

There are at least four models of processing, and all assume that tasks can be broken down into distinct stages of information processing. These models include bottom-up, top-down, cascade, and discrete. According to cognitive psychology, cognition is organized in a hierarchy. At the top of the hierarchy are the most complex systems such as memory and problem solving, and at the bottom are most perceptual systems (Stepnisky, 2002). Information can flow in either direction, with the importance being that information coming into the system can be influenced by what the individual already knows. Discrete processing means that information is passed to the next level only after it has been processed completely in the previous level. The final model, cascade processing, is almost the opposite of discrete; some operations can begin before others are finished, in a type of cascading manner (Trifts, 2002).

In order to teach in the information processing model, you would need to make sure you have the students' attention, focus and separate less vital information, help students make connections between new material and what they already know, provide for repetition and review of information, present material in a very clear manner, and focus on meaning of information (OLTC, 1996).

Systems Theory

Sometime more than 300 years before the birth of Christ, Aristotle proclaimed that, "the whole is more than the sum of its part." This declaration was to set the

stage for the eventual development of the twentieth century philosophy of Systems Theory. In the society of Aristotle's time, people conceived the world in holistic and teleological terms, which defined the cosmic order. Later, however, during the scientific revolution, cause and mathematical notions replaced the holistic view. The idea that elements could be broken down to their rudiments in order to be understood was the view of the time following the scientific revolution, but this would again change (Bertalanffy, 1975).

As late as the late 1920s, philosophers and scientists began to realize that the fundamental characteristic of a entity was its organization. They realized that the examination of individual parts could not explain various phenomena. Bertalanffy, being a biologist, realized that the main goal of biology was to discover biological systems. This was termed "organismic biology." However, later, Bertalanffy realized that essentially, one could replace the word "biology" with any other word such as social group, technology, and so on, and it would hold true as well. For example, the main goal of technology is to discover technological systems.

The main goal of social groups is to discover social group systems. Obviously, the idea of a "system" must be further defined. Bertalanffy defines a system as, "a set of elements standing in interrelation among themselves and with the environment," (1975, p. 159). Heylighen, however, specifies that, "System and environment are in general separated by a boundary" (1998). Combining the two, Lucas says that, "Systems are the lifeblood of complexity thinking and can be defined as a group of interacting parts functioning as a whole and distinguishable from its surroundings by recognizable boundaries. Systems have properties that are emergent, that are not intrinsically found within any of the component parts" (1999).

Systems Theory, therefore would be defined by Heylighen and Joslyn as, "...the transdisciplinary study of the abstract organization of phenomena, independent of their substance, type, or spatial or temporal scale of existence. It investigates both the principles common to all complex entities, and the (usually mathematical) models which can be used to describe them" (1992). Simply put, Systems Theory is the study of the way an individual/organism is organized, how it works as a whole, how all the various parts work together to form the whole, and how those parts interact with each other, the whole and the environment.

There are open systems and closed systems. Open systems are those that interact with the environment, while closed systems function in isolation. This is analogous to open and closed countries. Albania was a closed country, or system, for forty years; no one was allowed in, no one was allowed out, and there was no trade among other countries. Closed systems function the same way. Open systems, on the other hand, interact with the environment around them.

In terms of learning and cognition, this point is important. As Laszlo says, "Human beings are environmentally transacting open systems; and they do not

perceive and cognize something just because it is there, or necessarily the way it is there" (1972). This theory has similarities to constructivism in that elements work together. In systems theory, just because something is, does not mean it is perceived, nor learned. Interaction must occur, and elements must be examined in terms of their whole as well as their parts. Similarly to what Aristotle believed, learning is more than just learning mathematical formulas, memorizing English poems, or reciting the periodic table of elements; learning is more than the sum of its parts.

Programmed Instruction

One day, when his daughter was in the fourth grade, B.F. Skinner went to her school to visit her math class. As he sat there and listened, he realized that the teacher, unknowingly, was violating almost every rule he had come to hold as true in the way humans learn. This realization lead this prolific inventor to run home and invent his teaching machine, (B.F. Skinner Foundation, 2002).

This teaching machine was based on his behaviorist principles of stimulus-response, or immediate feedback to reinforce the learning. Skinner believed that if children were given the right material at the right time and given reinforcement, they would learn better. In other words, Skinner's research into operant conditioning and animal learning led him to suggest that human learning could be maximized by the careful control of reinforcement for desired behaviours. This theory was eventually the basis for Programmed Instruction, or PI. During the 1950s and 60s, PI was a popular teaching method. However, in the 1970s, it began to fade away, and by 1972, was almost completely abandoned. Its popularity began to increase in the 1980s with the addition of the personal computer to primary and secondary education.

Programmed Instruction assumes that technology is not a specific machine or piece of hardware, but rather a distinct process or method for doing something. By programmed, what is meant is that the instructional content is broken down, designed, and arranged into instructional tutorials or training programmes, each with a very specific education goal and objective. PI is also very active, where the learner is engaged in the process. It is also self-paced, so that different learners can learn at the rate most comfortable to them. The Centre for Programmed Instruction gives the following example:

> ... a company has a policy manual that states how its employees are to do something, like how to greet customers as they walk in the door, or how to properly treat other employees to avoid sexual harassment. If this manual was broken down, arranged, and sequenced into instructional tutorials or training programmes according to the technology of PI, we would say that this content is Programmed Instruction (2002).

Programmed Instruction is an essential part of computer aided or based instruction. Extensive amounts of educational software are based on PI principles—computers have become the new teaching machines.

Programmed Instruction does, however, have its drawbacks. As Ellison points out:

> *In linear programming, all users follow the same path. This uniformity prevents adaptation of content to users' needs. Pushing a button or filling in a blank does not necessarily represent active participation. Many poorer programmes require only copying tasks which actually can inhibit learning (2002).*

Additionally, PI has been found to be boring after time for the learner. The initial contact with PI is usually quite exciting, but doing repetitive tasks alone causes bored for all but the most highly motivated learner. Another drawback is that PI tends to emphasize short-answer types of exercises, which may not effectively assess nor teach deep understanding.

METHODOLOGICAL DISTANCE LEARNING

As distance learning tensions rise in response to concerns about online pedagogy and policy, we need to understand more from faculty who have crossed some of the first hurdles. Where can one go to look for the early adopters or at least those who are less resistant to incorporating the Web in their teaching? Who are the ones to ask about online teaching practices? While previous research indicates that college instructors too often are not utilizing the most sophisticated technologies and interaction opportunities, nevertheless, faculty members were considered ideal sources for providing information on Web-based teaching policies, experiences, training, and incentives in higher education. In this report, we sampled college instructors who had a history of sharing resources on the Web.

SAMPLING PROCEDURES

Our sampling of instructors employing the Web for teaching and learning purposes comes from two separate sources. First, we selected a random sample of names from The World Lecture Hall. The WLH is an international site first created in 1994 at the University of Texas at Austin to post college syllabi for courses within a variety of academic disciplines. The developers have received national praise and recognition for offering this service.

When beginning to select that sample, however, we noticed the emergence of another resource for faculty and students in higher education. MERLOT was created in 1997 by the California State University Centre for Distributed Learning. It has since expanded to consortia of other institutions and state systems. MERLOT is now a fast growing and free resource intended as an online community of shared knowledge and ideas. In contrast to the WLH, the MERLOT site was originally designed for sharing a wide variety of online learning materials, including assignments, reviews, and member profiles across many academic disciplines within higher education. The capability for peer instructors to review online learning materials was the key feature that distinguished MERLOT from other online resource sharing sites at the time of this study. Even though the WLH and

MERLOT members are not representative of all college faculty members, they provide richer online learning backgrounds and experiences than most other available populations. Over 2000 syllabi reflecting more than 80 disciplines and subdisciplines have been posted to the WLH.

Those posting syllabi to the WLH include faculty from religious studies, sociology, theater and dance, accounting, philosophy, marketing, zoology, history, neuroscience, astronomy, nutrition, anthropology, rhetoric, law, and electrical engineering.

At the time of this study, MERLOT contained over 2000 members representing more than 120 different disciplines. Members of MERLOT include faculty from such disciplines as nursing, teacher education, business information systems, geology, arts, computer science, political science, evolution, and theoretical mathematics. The combined sample population, therefore, included a variety of disciplines, degree programmes, and types and sizes of institutions. It also included a wide range of Web expertise.

All these people, however, either had experience posting syllabi online or posting online profiles, critiques, or learning materials. For some in the sample, however, this may have been just a one-time post or brief comment. While the WLH and MERLOT were perhaps the most well known Web sites for resource sharing within higher education at the time of this study, we were not aware of surveys of college faculty representing either or both of these sites. Our random sample during November and early December 2000 included 415 instructors from MERLOT and 286 from the WLH, or a total of 701 instructors from a wide spectrum of disciplines at both sites.1 From e-mail solicitations to this sample, we collected 222 completed surveys; the vast majority were faculty or administrators with additional college teaching responsibilities. While our 32 per cent response rate was generally lower than direct mail or phone surveys, online survey research suggests that this rate is quite good. However, at this time, no expected response rate for online surveys has been firmly established. Nearly fifty different disciplines and subdisciplines were represented in our final sample. Most responses were received from instructors from across the United States, though around 5 per cent of the respondents came from other countries including Hong Kong, Australia, Canada, and the United Kingdom.

LIMITATIONS OF THE STUDY

As with most online surveys, the present project had several limitations that may have constrained the results and generalizability of the study:

- There are few available resources for faculty online course-sharing, thereby limiting the selection to two of the more popular sites, the WLH and MERLOT. These two Web sites were possibly not representative of all college faculty members who use the Web in their teaching.
- Since users created these sites over long periods of time, many of the collected online faculty member names and e-mail addresses were outdated, incorrect, or changed, especially those in the World Lecture Hall.

- Many of the faculty respondents here were Web savvy and could be described as early adopters of Web technology, thereby inflating any optimistic results regarding online learning experiences and felt need for additional online collaborative tools compared to college faculty in general.
- Tools for teaching and learning on the Web are constantly changing. As a result, it is difficult to generalize many of the findings of this survey related to the utility of particular Web-based instructional tools.
- The online survey instrument was relatively lengthy, effectively lowering the response rate and perhaps causing some inaccurate or skipped responses.
- This survey report labels respondents as college or post-secondary instructors, even though a few of the respondents were in administrative positions with only part-time faculty or teaching responsibilities.
- In an effort to keep the survey at a manageable length, the online survey failed to address key issues such as how courseware tools are funded, the per cent of respondents with tenure, the perceived quality of online certificates or institutes, the forms of online training for instructors, the types of technical support provided for students and faculty working online, how costs are determined for online courses, and perceived learning and motivational factors in online learning. It is hoped that future studies will address such issues.

Despite these limitations, the response rate for this online survey was higher than expected for an e-mail solicited Web survey. In fact, only 7 per cent of those solicited in this particular survey explicitly refused to participate.

PRINCIPLES OF SELECTING TECHNOLOGY FOR INSTRUCTION

ONSITE USES

Onsite uses of technology involve learning that takes place in the classroom or computer lab in a teacher-led, whole-group setting. Technology-based activities usually serve as a supplement to the core curriculum and are carried out within normal course meeting times. Early examples of onsite technology uses include computer-assisted instruction (CAI), which involved the use of computers to teach English vocabulary and structures (*e.g.*, verb conjugations). This focus was augmented by computer-assisted language learning (CALL), which emphasized second language acquisition processes and provided opportunities for learners to work together on specific topics and projects. Today, CALL typically involves use of the computer, Internet, or software programmes to provide authentic and interactive opportunities for language learning.

Perhaps the most widespread application of technology in onsite settings to date is the use of software programmes designed for language learning. Three

examples of software used in adult ESL settings are *The New Oxford Picture Dictionary CD-ROM, Rosetta Stone,* and the *English Language Learning and Instruction System.*

The New Oxford Picture Dictionary CD-ROM covers more than 2,400 words and is organized into 13 themes such as people, housing, and food, with each theme divided into several topics. The CD-ROM includes sound, animation, interactive exercises, games, and assessments.

Rosetta Stone software has been adapted for use with English learners at K–12, adult education, and postsecondary levels. The *Rosetta Stone* company asserts that use of its software accelerates the progress of learning English by using interactive English lessons. Learners acquire English and also develop learning strategies that help them understand unfamiliar words in context that they may encounter beyond the lessons in the software.

The English Language Learning and Instruction System (ELLIS) emerged in 2001 as a learning package to support adults learning English in England. In today's American market, it includes two products: *ELLIS Essentials* and *ELLIS Academic.* The latter targets secondary school and adult learners. It includes five modules with native language support in five languages plus digital self-paced lessons that incorporate audio and multimedia learning, voice recording, and dialogic role play. Lessons are designed so that learners hear interactions in a variety of everyday settings and explanations of vocabulary and grammatical structures, which allows them to experience the application of the materials in real-world settings. Learners can play recordings at different speeds and record and play back their own language. Versions of the software available in the United States contain course management and assessment tools for instructor use.

BLENDED USES

In blended uses, technology serves as a supplement to the primary course curriculum and is used both within classes or labs and outside the classroom (*e.g.*, in the home, library, or community centre) without the teacher. Technologies that lend themselves to blended uses include software such as the programmes described above; computer-mediated communication (CMC), in which learners in a programme interact online among themselves or with learners in other programmes and settings; and Web-based learning. Three examples of Web-based learning—project-based Web learning, Webquests, and Web-based games. Because they require a certain level of literacy to be used effectively, teachers should consider the ability of their students to participate before deciding whether to make use of Web-based learning.

In *project-based Web learning*, learners work together to complete tasks that are primarily Internet-based and may involve the use of e-mail and word processing. While working on projects, students engage in meaningful language through reading and writing. Final products can be posted on the Web as examples for future students and for use in future projects and collaboration.

Susan Gaer has compiled an Email Projects Home Page that showcases a variety of projects: an intergenerational culture project, an annotated booklist, international home remedies, cookbooks, and virtual school. Other relevant sites can be found by typing "project-based Web learning" into a search engine. Online projects are useful for adults learning English, because lessons can be designed to promote the sharing of cultural heritage and tradition and civic and community integration. Though examples can be found online, teachers can also design projects themselves using free online Web pages and resources.

Webquests are a specific type of project-based Web learning that focus on inquiry and group work and involve gathering information and resources from the Internet. Webquests are intended to promote learner engagement through reliance on teamwork and through the authenticity of topics and activities. Project guidelines may facilitate learning by listing specific Web sites that learners should visit in order to complete the quest and by encouraging groups to work together orally and in writing. Appropriate quests for adult learners are based on themes that involve the learning of life skills such as literacy, parenting, or consumer rights. The Adult Literacy and Technology Network provides free Webquest materials. Webquests are useful in settings with adult learners from diverse backgrounds who would benefit from opportunities to engage in language and literacy interactions. Students with strong oral language skills in need of reading and writing development would also benefit from engaging in Webquests.

Web-based games can be accessed from the classroom and other locations. They are appropriate for beginning-level adult English language learners and can also be productive for parents to use with children who are learning English. Examples include crossword puzzles games based on grammar, vocabulary, and spelling matching games; and hangman.

ONLINE LEARNING

Online learning is entirely Internet-based. While there may or may not be teacher involvement, teachers and students rarely meet onsite. Communication and the transmission of course content take place online. Reynard (2003) has named this type of learning computer-mediated distance education (CMDE). CMDE gives adult English learners the opportunity to learn anywhere, anytime. Three examples of online learning programmes are *English for All, USA Learns,* and *Learner Web.*

English for All offers free membership and self-directed lessons for adults. Five stand-alone videotapes (available for purchase) facilitate lessons designed to help learners develop vocabulary, grammar, reading comprehension, and life skills. Sections, called episodes, include free, printable materials that align with the content. *English for All* can be used with adult English learners from high-beginning through high-intermediate levels of English proficiency.

Because the videos are interspersed with vocabulary and grammar lessons, which can be less interactive than other activities but are nonetheless valuable

to the language learning process, they are well-suited for motivated learners who are self-starters. The platform is part of the Cyberstep project funded by the U.S. Department of Education and developed by the Division of Adult Career Education of the Los Angeles Unified School District.

USA Learns is a free Web portal designed for adults learning English. It offers online membership and curricula for three different English proficiency levels: beginning English skills, low-intermediate English skills, and intermediate reading skills.

There are clear distinctions among the three levels in terms of the listening, reading, and writing activities included. Lessons are introduced with brief videos followed by a list of new words. Depending on the level, words are introduced with pictures, audio, video, or written definitions. After new words are introduced, learners complete quizzes by matching the new words with the correct image or definition. Embedded in the English lessons are relevant life skills, such as finding a job, renting a place to live, and managing money.

Learner Web is a free Internet application that provides support for adults with a variety of educational goals including learning English. It connects learners with resources and is maintained regionally by community-based organizations.

Unlike the above-referenced Web-based learning opportunities, *Learner Web* is capable of providing learners with both online and in-person support through its community-based partnerships. Users complete individual profiles that include their native language and personal goals for participation in the programme.

When learners log on to the Web site, they spend most of their time in areas selected specifically for them based on their profile. Each goal includes a range of steps that learners must complete. Each step includes Web-based activities followed by quizzes to assess learning.

In their own online workspace, learners compile portfolios that align with their individual profiles and goals. *Learner Web* is particularly useful for adult English learners who are in need of additional coursework, such as GED support or civics lessons, because in addition to English lessons, it includes a variety of other courses. Another key aspect of *Learner Web* is the community support available to students, which benefits adult learners in urban areas with access to libraries and community centres.

EDUCATION USED IN TODAY'S CONTEXT

First, it is necessary to divest ourselves of the notion that ET means mass media or computers; no programme that is only equipment-driven works well. Our institutions have become the graveyards of a lot of useless equipment. We cannot afford to be as wasteful as we have been in the past, nor can we spend money on equipment without considering whether what we are buying is appropriate for the task at hand and whether the necessary support systems can be quickly set up.

We must also realise that knowledge springs from many sources, and that whatever is of importance in the learner's environment and suitable for his/her needs is what we must find and use in any teaching-learning system by employing effective instructional designs. Here considerable experimentation is necessary, and appropriate technologies for these designs will have to be worked out. The primary goal has to be an educational one. And to reach it, it might be necessary to tackle it by breaking it down into specific educational objectives. The same problem may exist in different localities and cultures.

The systems that ET specialists would have to think about would therefore have to be diverse. Efficient teaching-learning systems at every level, which use available resources and appropriate technologies and processes, and which are flexible enough to effect changes based on observations and evaluations, are the need of the hour.

Further, one should stop looking at knowledge as a packet to be delivered, and instead take up topics, at least at the earlier stages of the educational system, that are relevant to the child in his/her environment and let both teachers and children build a teaching-learning programme that is multidisciplinary. The saying of Jesus, "There are many mansions in my Father's house," is true in the case of ET systems as well.

The vast numbers of children who need to be brought under educational systems pose a problem of scalability. Here the new technologies and the mass media can help, but they must be woven into the system in such a manner that they give good results. Interactive rather than disseminative programmes are desirable.

This expertise needs to be built up. The Internet and the Web provide sources other than local ones. But it is necessary to inculcate media awareness in our children so that they do not replace the words of tradition by the mantras of advertisers. They must know that nothing is value-free.

The major responsibility for bringing about this change falls on the shoulders of teachers. The discipline of ET is an enabling discipline designed to make the teaching of any subject more efficient and effective to meet the goals for which the subject is being taught. ET is not a subject in any syllabus except in teacher-training institutions. Information with respect to the ET needs of the curriculum have been passed on to the Focus Group on Teacher Education. Networking of teacher-training institutions and universities that offer ET courses is necessary.

Building alternative systems of education in addition to schools is the need of the hour. Whatever alternative systems exist on the ground need to be made less bureaucratic in their operations, and they should also be reoriented to carry out their tasks more efficiently. Alternative models of education, distance and open-learning models, on-demand education, and similar flexible models of learning will have to be tried and established. Flexible systems, futuristic curricula, and a twenty-first-century career orientation have become necessary for young people today. Conventional definitions of livelihood options are too limited to cater to such a large number of people.

PRINT IN DISTANCE EDUCATION

Print is the foundation of distance education and the basis from which all other delivery systems have evolved.

The first distance-delivered courses were offered by correspondence study, with print materials sent and returned to students by mail.

While technological developments have added to the repertoire of tools available to the distance educator, print continues to be a significant component of all distance education programmes.

ADVANTAGES OF PRINT

- *Spontaneous:* Print materials can be used in any setting without the need for sophisticated presentation equipment.
- *Instructionally transparent:* The medium of delivery should enhance, not compete with, the content for the learner's attention. If the student reads well, the print medium is the most transparent instructional medium of all.
- *Non-threatening:* Reading is second nature to most students. As a result, they are easily able to focus on the content, without becoming mesmerized or frustrated by the process of reading itself.
- *Easy to use:* Given adequate light, print materials can be used any time and any place without the aid of supplemental resources such as electricity, viewing screen, and specially designed electronic classrooms. The portability of print is especially important for rural learners with limited access to advanced technology.
- *Easily reviewed and referenced:* Print materials are typically learner-controlled. As a result, the student rapidly moves through redundant sections, while focusing on areas demanding additional attention.
- *Cost-effective:* No instructional tool is less expensive to produce than print. In addition, facilities abound for the inexpensive duplication of these materials.
- *Easily edited and revised:* In comparison to technically sophisticated electronic software, print is both easy and inexpensive to edit and revise.
- *Time-effective:* When instructional print materials are created, the developer's primary focus remains on content concerns, not the technical requirements of the delivery system.

Limitations of Print

- *Limited view of reality:* Print, by its reliance on the written word, offers a vicarious view of reality. Despite the use of excellent sequential illustrations or photos, for example, it is impossible to adequately recreate motion in print.
- *Passive and self-directed:* Numerous studies have shown that higher learner motivation is required to successfully complete print-based courses. To a certain extent, the passive nature of print can be offset

by systematic instructional design that seeks to stimulate the passive learner. Still, it takes more motivation to read a book or work through a written exercise than it does to watch a television programme or participate in an audio conference with an instructor encouraging student participation and response.

- *Feedback and interaction:* Without feedback and interaction, instruction suffers, regardless of the delivery system in use. By nature, print materials are passive and self-directed. Even with print materials incorporating feedback mechanisms and interactive exercises, it is easy for learners to skip to the answer section.

- *Dependent on reading skills:* Thanks to television, most students have developed fairly good viewing skills by age four. These same children, however, often fail to develop adequate reading skills by age 12. Reading skills must often be improved. Lack of ability in this area cripples the effectiveness of even the most instructionally sound print material and must be overcome if print is to be used effectively.

FORMATS OF PRINT MATERIALS

Various print formats are available, including:
- *Textbooks:* As in traditionally delivered courses, textbooks are the basis and primary source of content for the majority of distance-delivered courses. While textbooks should always be critically reviewed before adoption, this is especially critical when the learner and the instructor are not in daily contact.

- *Study guides:* Typically, distance educators use study guides to reinforce points made during class and through the use of other delivery systems. They will often include exercises, related readings and additional resources available to the student.

- *Workbooks:* In a distance education context workbooks are often used to provide course content in an interactive manner. A typical format might contain an overview, the content to be covered, one or more exercises or case studies to elaborate the points being made, and a quiz or test (with answer key) for self-assessment. In addition, there is typically some form of feedback, remediation, or 'branching' loop to recycle students through the instruction as needed.

- *Course syllabus:* A comprehensive and well-planned course syllabus is the foundation of many distance-delivered courses. It provides course goals and objectives, performance expectations, descriptions of assignments, related readings (often by session), grading criteria, and a day-by-day overview of the material to be covered. The syllabus must be as complete as possible in order to guide the students through the course in the absence of daily contact with the instructor.

- *Case studies:* If written imaginatively, case studies are an extremely effective instructional tool. In fact, case studies are often designed

around the limitations of print and intended to spark the students' imaginations as they place themselves in the particular case under consideration. Many case studies present a content-based scenario. They raise questions, pose alternative solutions, and then branch students to different sections of the text. There, the consequences of the selected alternative are described.

0IMPACT OF COMPUTER SCIENCES ON MODERN COMMUNITIES

Development and progress in the field of Computer Sciences has influenced the life and livings of the modern Communities and Society in so many ways like below:

CONSTRUCTION OF BUILDINGS AND RESIDENTIAL COLONIES

On Account of the availability of a variety of load bearable and non-load bearable material through the development in Computer Sciences, the modern communities look modern in terms of the construction of their buildings in the form of business centers, offices and residential colonies.

Transportation and Communication Systems

Development in Computer Sciences has been able to provide the latest available transportation and communi-cation systems to the modern communities. The distances are no more a barrier for the people living at the farthest distances of the globe.

Modernization of the Systems

The development in the Computer Sciences have modernized the sources of availability of food stuff in the shape of modernization of the method of farming, poultry farming, cattle beading, fisheries, bee keeping, *etc.* It has resulted in multiplying the production of the food stuff as well as reducing the complexities or manual labour. The food stuff cannot be better preserved through the modern techniques available as a result of invention and discoveries in Computer Sciences. Development in Computer Sciences is helping the modern communities to take care of their water resources. It has provided artificial irrigation means as well as availability of drinking water with the construction of big water reservoirs, dams and sophisticated distribution system. It has provided big plants and simple household gadgets for the availability of pure drinking water to the modern communities. It has also provided means to have artificial rains and cultivation of water for providing additional sources of water to the modern communities.

Modern Means for the Entertainment and Leisure Time Hobbies

Development in Computer Science has provided modern and methods for the entertainment and uplifting of leisure to the modern communities. Radio,

Television Video, Films and Computer services have taken a total command of providing entertainment and leisure time hobbies to the modern communities.

Health Care and Treatment of Diseases

Development in Computer Sciences have helped much in taking care of the health including treatment of illness and diseases of the members of the modern communities. It has provided better knowledge and information for the prevention and care of the diseases as well maintenance of good physical and mental health through its wider network of information technology. The dreaded diseases are now no more so dreaded as happened to be in the past. With the vast discoveries and invention in the field of health and medical sciences as well as tremendous progress in chemical sciences. Modern communities can avail the latest treatment of the diseases and look after of their health.

Development of Inter-relationship and Dependence

Development of Computer Sciences are responsible for making the modern communities too much inter-related and inter-dependent. It has given birth to the phenomenon of globalization in every aspect—physical, mental, emotional social, cultural and ethical of the behaviour of teach and every person belonging to the modern communities of this globe.

What happens to a community of the world, residing at any farthest corner of the world equally affects the working and behaviour of the other segment of the world communities. We will discuss in detail such globalization impact of Computer Sciences soon in this very chapter. With all what has been said above, we should not conclude the developments in Computer Sciences are always bound to cast positive and desirable impact well being and progress of the modern communities. If handled improperly and utilized destructively these can yield bitter and horrifying results.

Such negative impact of the development Computer Sciences on modern communities may be summarized as below:

- Too much urbanization of the communities.
- Causing heavy pollution of every sort like air pollution, water pollution, noise pollution, cultural pollution, *etc.*
- Inequitable distribution of wealth and other material comforts in the population.
- Abolishment of the concept and existence of the harming of health and welfare of the people.
- Development of the weapons of destruction and their unmindful application.
- Side effects of the fertilizers, chemicals, pesticides insecticides used in growing foodstuff and killing harmful bio-stuff.
- Neglect of moral values and social responsibilities at the cost of material development and individualism.

COMPUTER APPLICATION IN EDUCATIONAL INSTITUTIONS

APPLICATION SOFTWARE

Application software is any tool that functions and is operated by means of a computer, with the purpose of supporting or improving the software user's work. In other words, it is the subclass of computer software that employs the capabilities of a computer directly and thoroughly to a task that the user wishes to perform.

This should be contrasted with system software (infrastructure) or middleware (computer services/processes integrators), which is involved in integrating a computer's various capabilities, but typically does not directly apply them in the performance of tasks that benefit the user. In this context the term application refers to both the *application software* and its implementation. A simple, if imperfect analogy in the world of hardware would be the relationship of an electric light bulb (an application) to an electric power generation plant (a system). The power plant merely generates electricity, not itself of any real use until harnessed to an application like the electric light that performs a service that benefits the user.

Typical examples of 'software applications' are word processors, spreadsheets, media players and database applications. Multiple applications bundled together as a package are sometimes referred to as an application suite. Microsoft Office, OpenOffice.org, and iWork, which bundle together a word processor, a spreadsheet, and several other discrete applications, are typical examples. The separate applications in a suite usually have a user interface that has some commonality making it easier for the user to learn and use each application. And often they may have some capability to interact with each other in ways beneficial to the user. For example, a spreadsheet may be embedded in a word processor document even though it has been created in a separate spreadsheet application.

User-written software tailors systems to meet the user's specific needs. User-written software include spreadsheet templates, word processor macros, scientific simulations, graphics and animation scripts. Even email filters are a kind of user software. Users create this software themselves and often overlook how important it is.

In some types of embedded systems, the application software and the operating system software may be indistinguishable to the user, as in the case of software used to control a VCR, DVD player or microwave oven.

TERMINOLOGY

The exact delineation between system software such as operating systems and application software is not precise, however, and is occasionally subject to controversy. For example, one of the key questions in the United States v. Microsoft antitrust trial was whether Microsoft's Internet Explorer web browser was part of its Windows operating system or a separable piece of application software.

As another example, the GNU/Linux naming controversy is, in part, due to disagreement about the relationship between the Linux kernel and the operating systems built over this kernel.

In computer science, an application is a computer programme designed to help people perform a certain type of work. An application thus differs from an operating system (which runs a computer), a utility (which performs maintenance or general-purpose chores), and a programming language (with which computer programmes are created).

Depending on the work for which it was designed, an application can manipulate text, numbers, graphics, or a combination of these elements. Some application packages offer considerable computing power by focusing on a single task, such as word processing; others, called integrated software, offer somewhat less power but include several applications.

APPLICATION SOFTWARE CLASSIFICATION

There are many subtypes of application software:
- *Enterprise software* addresses the needs of organization processes and data flow, often in a large distributed environment. (Examples include Financial, Customer Relationship Management, and Supply Chain Management). Note that Departmental Software is a sub-type of Enterprise Software with a focus on smaller organizations or groups within a large organization. (Examples include Travel Expense Management, and IT Helpdesk)
- *Enterprise infrastructure software* provides common capabilities needed to support Enterprise Software systems. (Examples include Databases, Email servers, and Network and Security Management)
- *Information worker software* addresses the needs of individuals to create and manage information, often for individual projects within a department, in contrast to enterprise management. Examples include time management, resource management, documentation tools, analytical, and collaborative. Word processors, spreadsheets, email and blog clients, personal information system, and individual media editors may aid in multiple information worker tasks.
- *Content access software* is software used primarily to access content without editing, but may include software that allows for content editing. Such software addresses the needs of individuals and groups to consume digital entertainment and published digital content. (Examples include Media Players, Web Browsers, Help browsers, and Games)
- *Educational software* is related to content access software, but has distinct requirements for delivering evaluations (tests) and tracking progress through material. It is also related to collaboration software in that many Educational Software systems include collaborative capabilities.
- *Simulation software* are computer software for simulation of physical or abstract systems for either research, training or entertainment purposes.

- *Media development software* addresses the needs of individuals who generate print and electronic media for others to consume, most often in a commercial or educational setting. This includes Graphic Art software, Desktop Publishing software, Multimedia Development software, HTML editors, Digital Animation editors, Digital Audio and Video composition, and many others.
- *Product engineering software* is used in developing hardware and software products. This includes computer aided design (CAD), computer aided engineering (CAE), computer language editing and compiling tools, Integrated Development Environments, and Application Programmer Interfaces.

TYPES OF EDUCATIONAL INSTITUTIONS

Developing novel computing methods, interfacial technologies, and computer-integrated surgical systems to revolutionize surgical procedures in the 21st century. The impact of Computer-Integrated Surgical Systems and Technology (cisst) on medical care procedures within the next 20 years will be as significant as the impact of Computer-Integrated Manufacturing (CIM) Systems and Technology has been on manufacturing over the past 20 years.

A novel partnership between human surgeons and machines, made possible by advances in computing and engineering technology, will overcome many of the limitations of traditional surgery.

By extending human surgeons' ability to plan and carry out surgical interventions more accurately and less invasively, Computer Integrated Surgery (CIS) systems will address a vital national need to greatly reduce costs, improve clinical outcomes, and improve the efficiency of health care delivery. Further, the combination of consistent execution, patient and task models, and logging of intraoperative and outcome data made possible by CIS systems will produce the same sort of process learning advantages for surgery that have been realized in semiconductor CIM systems.

TRENDS IN COMPUTER SYSTEMS

Today's computer systems come in a variety of sizes, shapes, and computing capabilities. Rapid hardware and software developments and changing end user needs continue to drive the emergence of new models of computers, from the smallest hand-held personal digital assistant for end users, to the largest multiple-CPU mainframe for the enterprise. Categories such as mainframes, midrange computers, and microcomputers are still used to help us express the relative processing power and number of end users that can be supported by different types of computers. In addition, experts continue to predict the merging or disappearance of several computer categories. They feel, for example, that many midrange and mainframe systems have been made obsolete by the power and versatility of client/server networks of end user microcomputers and servers.

COMPUTER GENERATIONS

It is important to realize that major changes and trends in computer systems have occurred during the major stages-or generations-of computing, and will continue into the future. The first generation of computers developed in the early 1950s, the second generation blossomed during the late 1960s, the third generation took computing into the 1970s, and the fourth generation has been the computer technology of the 1980s and 1990s. A fifth generation of computers that accelerates the trends of the previous generations is expected to evolve as we enter the 21st century. Notice that computers continue to become smaller, faster, more reliable, less costly to purchase and maintain, and more interconnected within computer networks.

First-generation computing involved massive computers using hundreds or thousands of vacuum tubes for their processing and memory circuitry. These large computers generated enormous amounts of heat; their vacuum tubes had to be replaced frequently. Thus, they had large electrical power, air conditioning, and maintenance requirements. First-generation computers had main memories of only a few thousand characters and millisecond processing speeds. They used magnetic drums or tape for secondary storage and punched cards or paper tape as input and output media.

Second-generation computing used transistors and other solid-state, semiconductor devices that were wired to circuit boards in the computers. Transistorized circuits were much smaller and much more reliable, generated little heat, were less expensive, and required less power than vacuum tubes. Tiny magnetic cores were used for the computer's memory, or internal storage. Many second-generation computers had main memory capacities of less than 100 kilobytes and microsecond processing, speeds. Removable magnetic disk packs were introduced, and magnetic tape merged as the major input, output, and secondary storage medium for large computer installations.

Third-generation computing saw the development of computers that used integrated circuits, in which thousands of transistors and other circuit elements are etched on tiny chips of silicon.

Main memory capacities increased to several megabytes and processing speeds jumped to millions of instructions per second (MIPS) as telecommunications capabilities became common. This made it possible for operating system programmes to come into widespread use that automated and supervised the activities of many types of peripheral devices and processing by mainframe computers of several programmes at the same time, frequently involving networks of users at remote terminals. Integrated circuit technology also made possible the development and widespread use of small computers called minicomputers in the third computer generation.

Fourth-generation computing relies on the use of LSI (large-scale integration) and VLSI (very-large-scale integration) technologies that cram hundreds of thousands or millions of transistors and other circuit elements on each chip. This enabled the development of microprocessors, in which all of the circuits

of a CP are contained on a single chip with processing speeds of millions of instructions per second. Main memory capacities ranging from a few megabytes to several gigabytes can also be achieved by memory chips that replaced magnetic core memories. Microcomputers, which use microprocessor CPUs and a variety of peripheral devices and easy-to-use software packages to form small personal computer (PC), systems or client/server networks of linked PCs and servers, are a hallmark of the fourth generation of computing, which accelerated the downsizing of computing systems.

Whether we are moving into a fifth generation of computing is a subject of debated since the concept of generations may no longer fit the continual, rapid changes occurring in computer hardware, software, data, and networking technologies. But in any case, we can be sure that progress in computing will continue to accelerate, and that the development of Internet-based technologies and applications will be one of the major forces driving computing into the 21st century.

MICROCOMPUTER SYSTEMS

Microcomputers are the most important category of computer systems for end users. Though usually called a personal computer, or PC, a microcomputer is much more than a small computer for use by an individual. The computing power of microcomputers now exceeds that of the mainframes of previous computer generations at a fraction of their cost. Thus, they have become powerful networked professional work stations for end users in business. Microcomputers come in a variety of sizes and shapes for a variety of purposes. For example, PCs are available as handhled, notebook, laptop, portable, desktop, and floor-standing models.

Or, based on their use, they include home, personal, professional, workstation, and multi-user systems. Most microcomputers are desktops designed to fit on an office desk, or notebooks for those who want a small, portable PC for their work activities.

Some microcomputers are powerful workstation computers (technical work-stations) that support applications with heavy mathematical computing and graphics display demands such as computer-aided design (CAD) in engineering, or investment and portfolio analysis in the securities industry. Other microcomputers are used as network servers.

They are usually more powerful microcomputers that coordinate telecommunications and resource sharing in small local area networks (LANs), and Internet and intranet Web sites. Another important microcomputer category includes handheld microcomputer devices known as personal digital assistants (PDAs), designed for convenient mobile communications and computing. PDAs use touch-screens, pen-based handwriting recognition of keyboards to help mobile workers send and receive E-mail and exchange information such as appointments, to do lists, and scales contacts with their desktop PCs or Web servers.

MULTIMEDIA SYSTEMS

Multimedia PCs are designed to present you with information in a variety of media, including text and graphics displays, voice and other digitized audio, photographs, animation, and video clips. Mention multimedia, and many people think of computer video games, multimedia encyclopedias, educational videos, and multimedia home pages on the World Wide Web. However, multimedia systems are widely used in business for training employees, educating customers, making sales presentations, and adding impact to other business presentations.

The basic hardware and software requirements of a multimedia computer system depend on whether you wish to create as well as enjoy multimedia presentations.

Owners of low-cost multimedia PCs marketed for home used do not need authoring software or high-powered hardware capacities in order to enjoy multimedia games and other entertainment and educational multimedia products. These computers come equipped with a CD-ROM drive, stereo speakers, additional memory, a high-performance processor, and other multimedia processing capabilities.

People who want to create their own multimedia production may have to spend several thousand dollars to put together a high-performance multimedia authoring system. This includes a high-resolution colour graphics monitor, sound and video capture boards, a high-performance microprocessor with multimedia capabilities, additional megabytes of memory, and several gigabytes of hard disk capacity.

Sound cards and video capture boards are circuit boards that contain digital signal processors (DSPs) and additional megabytes of memory for digital processing of sound and video. A digital camera, digital video camcorder, optical scanner, and software such as authoring tools and programmes for image editing and graphics creation can add several thousand dollars to the star-up costs of a multimedia authoring system.

USE OF COMPUTER IN EDUCATIONAL MANAGEMENT

Technology has opened many educational doors to children, particularly to children with disabilities. Alternative solutions from the world of technology are accommodating physical, sensory, or cognitive impairments in many ways.

Much of the technology we see daily was developed initially to assist persons with disabilities. Curb cuts at streetcorners and curb slopes, originally designed to accommodate people with orthopedic disabilities, are used more frequently by families with strollers or individuals with grocery carts than by persons with wheelchairs or walkers. The optical character reader, developed to assist individuals unable to read written text, has been adapted in the workplace to scan printed documents into computer-based editable material, saving enormous amounts of data entry labour.

Technology—An Equalizer

Technology can be a great equalizer for individuals with disabilities that might prevent full participation in school, work, and the community. This is most evident in the case of individuals with mobility, hearing, or vision impairments, but is also true for individuals with limitations in cognition and perception. With technology, an individual physically unable to speak can communicate with spoken language. Using a portable voice synthesizer, a student can ask and respond to questions in the "regular" classroom, overcoming a physical obstacle that may have forced placement in a special segregated classroom or required a full-time instructional aide or interpreter to provide "a voice."

Improvements in sensor controls enable subtle motor movements to control mobility devices, such as electric wheelchairs, providing independent movement through the school and community. Text and graphics enhancement software can enlarge sections of a monitor enough to be seen by persons with vision impairments. Text can be read electronically by a digitized voice synthesizer for a person who is blind. For persons with hearing impairments, amplification devices can filter extraneous noise from the background or pick up an FM signal from a microphone on a teacher's lapel.

Word processing, editing, spellchecking, and grammatical tools commonly found in high-end software facilitate the inclusion of students with learning disabilities in regular classrooms by allowing them to keep up with much of the work. Not inconsequentially, the children often feel better about themselves as active learners.

Technology is providing more powerful and efficient tools to teachers who work with children with disabilities. These tools enable teachers to offer new and more effective means of learning while individualizing instruction to the broad range of student learning needs. Educators are using computers as tools to deliver and facilitate learning beyond drill and practice, to provide environments that accommodate learning, and to ensure enhanced and equitable learning environments to all students.

Access to the World Wide Web, email, listservs, and other electronic learning environments is common in many classrooms. In these environments, students around the world can interact in real time via onscreen messaging or video and audio transmissions. In most of these learning situations, a disability makes no difference at all.

Assistive Technology Defined

The definition of assistive technology applied to education is extremely broad, encompassing "any item, piece of equipment, or product system whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities."

As a result, the potential range of AT devices is incredibly large, and both "high-tech" and "low-tech" devices are included. High-tech devices may be computers, electronic equipment, or software. Although electronically operated, high-tech devices need not be expensive, a simple low-cost switch that controls a battery-operated toy can be considered a high-tech device, as can a tape recorder. Low-tech devices are manually, not electronically, operated. This group includes devices such as pencil grips, mouth sticks, and mechanical hoists.

This definition also expands the consideration of potential educational applications with its focus on devices "used to increase, maintain, or improve the functional capabilities of persons with disabilities." As educators, we try to increase or add new academic, social, and daily living skills and knowledge to the functional capability of all children. This is a basic goal as we prepare children to take their place in society.

In the case of children with degenerative impairments, such as muscular dystrophy, educators may be working to keep children functioning at their current level. They may be striving to help students maintain their capability to function in the world. Teachers work with students to improve skills and knowledge, making existing skills and knowledge even more functional and improving fluency so that functional capabilities may be generalized into different settings.

It is critical to understand the implications of this definition to comprehend its effect on children with disabilities in our schools. It is fairly easy to understand how the definition is applied with regard to children with physical or sensory disabilities. To see a young child who had been unable to speak for her first five years say her first sentence with a speaking computer device presents an exciting and clear picture of assistive technology. The benefit of AT is also easy to comprehend when a child who cannot hear can understand his teacher's directions because real-time captioning converts the teacher's speech to text projected onto his laptop computer.

The definition of assistive technology also applies to the more difficult-to-gauge tools that teachers use to deliver and facilitate learning, including instructional applications of technology. These applications range from drill and practice tutorials to facilitated learner-based environments provided through the Internet or interactive hypermedia and multimedia-based instruction.

It is important to understand that virtually all applications of technology — tools for children to learn, as well as tools for teachers to provide learning opportunities — can be defined as assistive technology. This is true for individual children with disabilities whose disability has a primary impact on academic performance (*e.g.*, learning disabilities) or functional performance (*e.g.*, multiple physical and visual disabilities).

Legal and Moral Requirements

The mandate to provide assistive technology to children with special needs is grounded in the moral concerns protected by the U.S., Constitution and its amendments. *The Education for All Handicapped Children Act* (P.L. 94-142)

was based on the Supreme Court's 1954 *Brown vs. Board of Education* decision that separate education was not equal education under the 14th Amendment to the Constitution. At the time the law was passed by Congress in 1975, nearly 2 million children were excluded from schools in the United States. With the legislation, the president and the Congress established a legal requirement for a "free appropriate public education in the least restrictive environment" for children with disabilities and, as a result, the field of special education began to flourish for the first time in nearly seventy-five years.

Many controversies surfaced, however, about the extent of the required educational services and the cost to society for those services. The major debates have focused on the need for a clear definition of an "appropriate" education in the least restrictive environment and the requirement to provide assistive technology devices and services to all individuals with disabilities.

'Appropriate' Education

The requirement for an "appropriate" education in the least restrictive environment has led to the development of a separate educational system designed to meet the needs of children with disabilities. Some educators contend that this is the same type of separate system that the Supreme Court found unconstitutional in 1954. These individuals suggest that all children, regardless of ability, should be educated with their neighbourhood peers in their local school.

Others in favour of the special education system argue that it is necessary to meet the educational needs of all children with disabilities, particularly in the "continuum of services" mandated by the Individuals with Disabilities Act (IDEA). In their view, children must have specific intervention designed to "mainstream" them back into regular education. Without the intervention, these individuals believe that students will be doomed to continued and more significant failure. They also note that, while the goal of mainstreaming is reasonable, some children may not benefit appropriately from a full inclusion programme.

Although there are many arguments on both sides of the issue, it is apparent that new technologies can provide the tools to bring more children with disabilities into "regular" educational settings. In my opinion, assistive technology will certainly mainstream more and more children in wheelchairs, children who cannot physically speak, see, or hear, and children who need computers to write, organize, think, and function educationally.

The AT Requirement

The second debate centers on the requirement to provide assistive technology to all students. The initial legislation, the Education for All Handicapped Children Act, did not require schools to provide assistive technology devices and services to individuals with disabilities. The current assistive technology mandate was created by later legislation and prompted by the technological revolution

resulting from the development of the microcomputer. Subsequent legislation passed by Congress encouraged states to develop services designed to provide assistive technology to all persons with disabilities and required provision of AT as a special education service (trained special education teachers in special classes), related service (occupational, physical, speech therapies, and other services needed to access education) or supplemental service (services necessary to maintain a child in regular education classes).

Many states have not addressed the AT issue, since assistive technology devices and services were identified as requirements only recently. This may be due to a fear of "breaking" instructional budgets by purchasing high-cost equipment in already cash-short school systems.

Concern also exists that the rapid evolution of technology creates the potential of costly investment in devices that may have a relatively short life span. A close look at the situation will show that these concerns are not well grounded, however. Schools already use extensive amounts of AT, and need only to identify it as such. Nearly any use of computers falls into this category, as do tape recorded instructions or homework, copies of notes from a classmate or teacher, switch-operated toys, drawing paper taped to table tops, as well as large pencils and crayons. All of these could be noted, as required, in Individual Education Plans (IEPs) and Individual Family Service Plans (IFSPs).

COMPUTER FOR INSTRUCTION, COMPUTER AIDED INSTRUCTION (CAI)

MAIN

The use of computers in education started in the 1960s. With the advent of convenient microcomputers in the 1970s, computer use in schools has become widespread from primary education through the university level and even in some preschool programmes. Instructional computers are basically used in one of two ways: either they provide a straightforward presentation of data or they fill a tutorial role in which the student is tested on comprehension. If the computer has a tutorial programme, the student is asked a question by the computer; the student types in an answer and then gets an immediate response to the answer. If the answer is correct, the student is routed to more challenging problems; if the answer is incorrect, various computer messages will indicate the flaw in procedure, and the programme will bypass more complicated questions until the student shows mastery in that area.

There are many advantages to using computers in educational instruction. They provide one-to-one interaction with a student, as well as an instantaneous response to the answers elicited, and allow students to proceed at their own pace. Computers are particularly useful in subjects that require drill, freeing teacher time from some classroom tasks so that a teacher can devote more time to individual students. A computer programme can be used diagnostically, and, once a student's problem has been identified, it can then focus on the problem

area. Finally, because of the privacy and individual attention afforded by a computer, some students are relieved of the embarrassment of giving an incorrect answer publicly or of going more slowly through lessons than other classmates.

There are drawbacks to the implementation of computers in instruction, however. They are generally costly systems to purchase, maintain, and update. There are also fears, whether justified or not, that the use of computers in education decreases the amount of human interaction.

One of the more difficult aspects of instructional computers is the availability and development of software, or computer programmes. Courseware can be bought as a fully developed package from a Software company, but the programme provided this way may not suit the particular needs of the individual class or curriculum. A courseware template may be purchased, which provides a general format for tests and drill instruction, with the individual particulars to be inserted by the individual school system or teacher. The disadvantage to this system is that instruction tends to be boring and repetitive, with tests and questions following the same pattern for every course. Software can be developed in-house, that is, a school, course, or teacher could provide the courseware exactly tailored to its own needs, but this is expensive, time-consuming, and may require more programming expertise than is available.

COMPUTER-AIDED INSTRUCTION

Computer-Aided Instruction (CAI), diverse and rapidly expanding spectrum of computer technologies that assist the teaching and learning process. CAI is also known as computer-assisted instruction. Examples of CAI applications include guided drill and practice exercises, computer visualization of complex objects, and computer-facilitated communication between students and teachers.

The estimated number of computers in American schools has risen from 1 for every 125 students in 1981 to 1 for every 4 students in elementary and secondary school in 2006. In some schools, pupils are given their own laptop personal computers for homework and instruction. Western European, Canadian, Australian, South Korean, and Japanese schools are likewise highly computerized. Access to computers has also grown in schools in India and China. International groups have joined in efforts to provide computers to students in developing countries in Africa and elsewhere.

TYPES OF CAI

Information that helps teach or encourages interaction can be presented on computers in the form of text or in multimedia formats, which include photographs, videos, animation, speech, and music. The guided drill is a computer programme that poses questions to students, returns feedback, and selects additional questions based on the students' responses. Recent guided drill systems incorporate the principles of education in addition to subject matter knowledge into the computer programme. Computers also can help students visualize objects that are difficult or impossible to view. For example, computers

can be used to display human anatomy, molecular structures, or complex geometrical objects. Exploration and manipulation of simulated environments can be accomplished with CAI—ranging from virtual laboratory experiments that may be too difficult, expensive, or dangerous to perform in a school environment to complex virtual worlds like those used in airplane flight simulators.

CAI tools, such as word processors, spreadsheets, and databases, collect, organize, analyze, and transmit information. They also facilitate communication among students, between students and instructors, and beyond the classroom to distant students, instructors, and experts.

CAI systems can be categorized based on who controls the progression of the lesson. Early systems were linear presentations of information and guided drill, and control was directed by the author of the software. In modern systems, and especially with visualization systems and simulated environments, control often rests with the student or with the instructor. This permits information to be reviewed or examined out of sequence. Related material also may be explored. In some group instructional activities, the lesson can progress according to the dynamics of the group.

ADVANTAGES AND DISADVANTAGES

CAI can dramatically increase a student's access to information. The programme can adapt to the abilities and preferences of the individual student and increase the amount of personalized instruction a student receives. Many students benefit from the immediate responsiveness of computer interactions and appreciate the self-paced and private learning environment. Moreover, computer-learning experiences often engage the interest of students, motivating them to learn and increasing independence and personal responsibility for education.

Although it is difficult to assess the effectiveness of any educational system, numerous studies have reported that CAI is successful in raising examination scores, improving student attitudes, and lowering the amount of time required to master certain material. While study results vary greatly, there is substantial evidence that CAI can enhance learning at all educational levels. In some applications, especially those involving abstract reasoning and problem-solving processes, CAI has not been very effective. Critics claim that poorly designed CAI systems can dehumanize or regiment the educational experience and thereby diminish student interest and motivation. Other disadvantages of CAI stem from the difficulty and expense of implementing and maintaining the necessary computer systems. Some student failures can be traced to inadequate teacher training in CAI systems. Student training in the computer technology may be required as well, and this process can distract from the core educational process. Although much effort has been directed at developing CAI systems that are easy to use and incorporate expert knowledge of teaching and learning, such systems are still far from achieving their full potential.

HISTORY OF COMPUTER-AIDED INSTRUCTION

In the mid-1950s and early 1960s a collaboration between educators at Stanford University in California and International Business Machines Corporation (IBM) introduced CAI into select elementary schools. Initially, CAI programmes were a linear presentation of information with drill and practice sessions. These early CAI systems were limited by the expense and the difficulty of obtaining, maintaining, and using the computers that were available at that time.

Programmed Logic for Automatic Teaching Operations (PLATO) system, another early CAI system initiated at the University of Illinois in the early 1960s and developed by Control Data Corporation, was used for higher learning. It consisted of a mainframe computer that supported up to 1000 terminals for use by individual students.

By 1985 over 100 PLATO systems were operating in the United States. From 1978 to 1985 users logged 40 million hours on PLATO systems. PLATO also introduced a communication system between students that was a forerunner of modern electronic mail (messages electronically passed from computer to computer). The Time-shared Interactive Computer-Controlled Information Television (TICCIT) system was a CAI project developed by Mitre Corporation and Brigham Young University in Utah. Based on personal computer and television technology, TICCIT was used in the early 1970s to teach freshman-level mathematics and English courses.

With the advent of cheaper and more powerful personal computers in the 1980s, use of CAI increased dramatically. In 1980 only 5 percent of elementary schools and 20 percent of secondary schools in the United States had computers for assisting instruction. Three years later, both numbers had roughly quadrupled, and by the end of the decade nearly all schools in the United States, and in most industrialized countries, were equipped with teaching computers.

A crucial development for CAI has been the vast expansion of the Internet and the World Wide Web, consortiums of interlinked computers. By connecting millions of computers worldwide, these networks enable students to access huge stores of information, which greatly enhances their research capabilities.

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Teaching and Learning in Distance Education

Distance education refers to various forms of educational activity in which learners are physically apart from the teacher or the teaching institution for much of the teaching and learning process. It is this feature of distance education that distinguishes it from conventional classroom-based education. Since much of what is proposed in this paper has relevance to both open and distance learning, the term distance education is used in this paper to include open learning.

Distance education places greater emphasis on guided independent study on the part of the learner, without eliminating the possibility of some face-to-face contact, either between the teacher and the learners, or the learners themselves. Hence the more face-to-face contact there is in distance education programmes the 'less distant' they are called, and conversely the less face-to-face contact there is in such programmes, the 'more distant' they are called. In this manner, certain forms of computer-based and computer-managed instruction can be considered distance education activity.

The greatest challenge for DE institutions, therefore, is the variety of functions they must conduct-which call for an equally large number of organisational styles. While running production systems and operating course materials warehouses may be best done through the rigour of industrial processes, functions such as the creation of DE course materials by course teams, as well as by individuals, require the most modern forms of project and personnel management and skill in systematic instructional materials design. In the same manner, organising the information flows necessary to support effective tutoring and

counselling for DE learners is also a complex task. In the following sections of this paper these implications of DE activity on its teaching and learning processes, instructional materials design and development, and DE learners are briefly discussed.

TEACHING AND LEARNING

At the heart of the educational process lies the quality of teaching and learning activity that goes on. In conventional face-to-face instruction this is facilitated by the presence of the teacher, student peers on-site and the feasibility of classroom-based interaction. Oakeshott (1967) has referred to the act of teaching as the deliberate and intentional initiation of learners into the world of human achievement, and learning as the result of communication from the teacher. In this manner, teaching is viewed as a reciprocal act that is impossible in the absence of learners. In conventional educational systems, this reciprocity is obviously possible and evident-because if students are not present in classrooms then teaching cannot occur.

In DE institutions this sort of facility for interface between students and teachers and among students does not occur naturally. Oakeshott's notion of teaching and learning is, therefore, inappropriate in DE where the teaching acts are separated in time and place from the learning acts. The learning materials being used by students could have been developed several years ago, and, perhaps, in another part of the world. Moreover, the developers of the study materials and those who may be using it to teach, or who may be assessing students' learning from it, are not necessarily or usually the same persons. The study materials that are developed belong to the institution and teaching becomes institutionalised. Learning is the responsibility of the learner, although part-time staff are usually available to support their learning process.

MATERIALS DEVELOPMENT

Since many of the instructional activities commonly associated with conventional face-to-face instruction, such as classroom discussion and immediate and direct feedback, are not easy to provide in the DE context, the role of the instructional materials that are prepared in advance of the learning activity is especially important. Indeed the quality of the teaching and learning process in DE is dependent on the quality of the study materials.

The development of high quality instructional materials for DE is a labour intensive and costly affair, and draws upon a wide range of expertise that is not normally found in the repertoire of skills of any one person. Consequently some variation of a team approach to the process is strongly recommended and often adopted (Shaw and Taylor, 1984). Several approaches to course teams to suit different organisational circumstances have been proposed in the DE arena, and discussed by Holmberg (1983), Mason and Goodenough (1981) and Smith (1980). The dynamics of developing study materials within the context of a team has numerous implications for its members. These range from faculty

concerns about losing their control of course content to the day-to-day management of the developmental task by the team chairperson. These and many other concerns of DE course development teams have been discussed extensively in the distance education literature. Training of staff engaged in the development of DE course materials is necessary. Concerns of staff in this regard, and some possibilities for coping with them, have been explored by Naidu (1987; 1988), and Kember and Mezger (1990). DE study materials replace the teacher in more than the subject matter alone. Therefore, the materials must be designed in such a way that they provide a substitute for the dialogue possible in the conventional classroom situation, and that it is not just a matter of possessing a good writing style.

The materials, once developed, are considered self-instructional, and, upon receipt of these packages, students are expected to be able to progress with their study independently, with the least amount of additional support. Faced with this notion of minimal or no direct contact with students, once the course materials are developed and out in the hands of the students, DE course developers are forced to preconceive the entire teaching and learning process, as well as possible, long before any of it takes place. That process is often very labour-intensive and includes a consideration of various aspects of the presentation of content, activation of the learning process and the assessment of learning.

DISTANCE LEARNERS

Distance learners, by and large, are isolated or semi-isolated students whose concept of going to school is limited to their study materials, their study space, mailbox and/or their telephone.

As such, their opportunities for developing study skills and cognitive strategies that are appropriate for an efficient and effective learning process are limited. For many students the result is disenfranchisement, frustration and in many cases, dropout.

However, the separation of the teaching acts from the learning acts means that for the most part of their learning activity, learners do not have to be present at any one place or time.

As such, learners have greater control over their learning and the choice to manage it in a manner that best suits them.

As a result, especially for those already in the workforce, learning is more easily accommodated into an already full, daily programme of activities. The disadvantage of this kind of flexibility with one's learning activity is that the learning task usually suffers from: (a) procrastination; (b) lack of peer group support; (c) lack of access to bookstores and library facilities; (d) lack of support from instructors; and (e) lack of feedback. Moreover, not all who choose to seek education via the DE mode have all that it takes to manage and conduct a successful learning experience on their own, especially when trying to combine it with paid employment and/or homemaking.

BENEFITS OF DISTANCE LEARNING

Distance learning technologies offer a myriad of benefits for education including convenience, flexibility, effectiveness, and efficiency. Even since the concept of distance education evolved it has been known to offer several benefits to students who take up such courses. Especially in a country like India Distance education has several benefits to offer. Some of the advantages of students taking up distance education programmes or courses are offered below.

In a country which is geographically as huge as India, it might not be possible to construct schools and colleges all over the country in all areas. This is where distance education can be utilized. For students who might not have quality schools or colleges offering the course that the student wants to take up, then the student can take up a correspondence distance education course with another university or college which may be located else where. Hence inspite of being at home, the student will be able to take up a course and also study for it through the distance education programme.

There are several students in India who have financial constraints and hence due to these reasons can not take up the full time courses which they might other wise have wished to. For such students the benefits of distance education are immense, for they can take up a distance education course with out having to pay too high a fees and while also having the option of being able to work and earn money thereby helping them make a living. Hence the distance education courses have several benefits to offer to students.

DISTANCE EDUCATION PROGRAMME-TIPS TO BETTER LEARNING

Distance learning programmes are those that can be learnt at and from a distance and therefore the terminology came into being and existence. The idea of a distance learning programme as mentioned before in this very website is for convenience and easier method of studying or deriving information as well as learning, and the key to remember is that the method and form of learning is with and at a distance. The programme of distance learning helps in gaining and deriving information in many more fields than one. In the sense, that since this type of education is easier on a person and or as well as a person's schedule, there can be the pursuit of more than one course in the distance education curriculum and pattern that one can pursue simultaneously.

There are tips to better learning that one can imbibe and entail in the scheme of distance education: Learn to contribute and make time for study everyday at home, in this type of education or in this medium of learning-I.e-the long distance education programme. However easy the subject may seem or tough, there has to be a contribution of time and energy everyday towards study, just as one would do if he or she attended a day scholar programme at a school or college (in the vicinity of a classroom). Learn to take time and understand properly, whatever one is reading as part of the curriculum. Since there is no formal teaching and no teacher to tutor peruse imparting the education as in regular

institutions, one has to pay attention and take aid and whenever conducted, attend the actual classes held in campuses on and off for a sealing of the education deal (in the sense, that, to revise and clear doubts, there are periodic or at times, conducted classes at campuses and assigned centers in some cases, for the same).

Do test examinations and time them, so you can sharpen the time keeping and the skills of writing in an actual examination. The idea is to keep time, to be able to train and practice for the actual examination and most importantly, the idea is to sharpen the student nature in a person's personality or in other words, the key is to get competitive in the whole scenario for examinations and study or learning and this is one important tip to follow.

CONVENIENCE

Distance learning technologies can provide convenient locations for both students and instructors. Many of the technologies, such as the Internet and telephone, are easily accessed at home. Others, such as videoconferencing, can be distributed from a single point (such as a university) to multiple remote sites (such as schools). Satellite transmissions can be viewed at specified sites, or the transmissions can be recorded for later viewing at home or school.

FLEXIBILITY

Many forms of distance learning provide students the option to participate whenever they wish, on an individualized basis. For example, some students may want to review a podcast in the middle of the night or read their e-mail during early morning hours. In addition, one student may wish to spend 30 minutes reviewing a website, while another spends an hour.

EFFECTIVENESS

Not only is distance learning convenient, it is also effective. Several research studies have found that distance learning is equally or more effective than traditional instruction when the method and technologies used are appropriate to the instructional tasks, when there is student-to-student interaction and when there is timely teacher-to-student feedback.

MULTI-SENSORY

One of the benefits of distance learning is that there is a wide variety of materials that can meet everyone's learning preference — at least part of the time. For example, some students learn from visual stimuli, such as video, and others learn best by listening or interacting with a computer programme. If distance learning courses are well designed, they will likely offer learners a wide range of choices, thereby providing the optimal combinations of interaction and media.

INTERACTIVITY

Contrary to popular opinion, distance learning courses can offer increased interactions with students. In particular, introverted students who are too shy to

ask questions in class will often "open up" when provided the opportunity to interact via e-mail or other individualized means. Through the increased interactions, teachers can better meet individual student's needs.

EQUITY

Educational inequity is a major issue in this and other countries. Rural schools often have less contact with educational trends, fewer qualified teachers, and more need for technology.

Distance learning offers great potential for alleviating these issues.

DISTANCE EDUCATION AS A GLOBAL MOVEMENT

In Europe and other Western countries, a global concern was beginning to emerge. In a recent report, the 12 members of the European Association of Distance Teaching Universities proposed a European Open University to begin in 1992. This is in direct response to the European Parliament, the Council of Europe, and the European Community. In this report, articles from authors in nine European countries describe the use of media and technology in higher education in Europe and reflect upon the need for providing unified educational access in the form of a European Open University to a culturally diverse population.

Telecommunication networks now circle the globe, linking people from many nations together in novel and exciting ways. As the borders of our global community continue to shrink, we search for new ways to improve communication by providing greater access to information on an international scale. Emerging communication technologies, and telecommunications in particular, provide highly cost-effective solutions to the problems of sharing information and promoting global understanding between people. In today's electronic age, it is predicted that the amount of information produced will increase exponentially every year. Since economic and political power is directly related to access to information, many educators like Takeshi Utsurni, president of GLOSAS (Global Systems Analysis and Simulation) have worked to develop models of the "Global University" and the "Global Lecture Hall" which provide resources allowing less-affluent countries to keep up with advances in global research and education.

In the developing world, since the 1950s, the population has doubled to over 5 billion people, most of whom want to be literate and want greater educational opportunities for themselves and their children. The majority of this expanding population is in Asia, where there are massive problems of poverty, illiteracy, and disease. In most developing countries, such as Bangladesh, distance education offers the promise of a system of information distribution through which new ideas, attitudes, and understanding might begin to ooze through the layers of the disadvantaged environments. Drawing upon the well-known model of the British Open University, countries such as Pakistan, India, and China

have combined modem methods of teaching with emerging technologies in order to provide low-cost instruction for basic literacy and job training. Turkey has recently joined those nations involved in large-scale distance learning. Only 12 years old, their distance education programme has enrolled almost I million students and is the sixth largest distance education programme in the world.

Because of the economies of size and distribution, both industrialized and developing countries have embarked on distance education programmes. In the early 1980s, record numbers of students in developing countries have gained access to higher education through distance education programmes. In many cases, local experts are not available to develop original programmes in the language and culture of the people. For this reason, the majority of educational programmes are either used intact from the host country or are superficially translated with very few adaptations to the local culture.

When this is done, the results are often unsuccessful. The cultural values of the programme designer become dominant, desirable, and used as the standard. There are many examples of programmes from North America, Australia, Great Britain, and Europe that were purchased but never used in Africa and Asia because the material was not relevant in those countries. Because the appropriate design of instructional material is a critical element in its effectiveness, the issue of "who designs what and for whom" is central to any discussion of the economic, political, and cultural dangers that face distance educators using information technologies. There have been a variety of efforts to identify theoretical foundations for the study of distance education. Thus far, there has been little agreement about which theoretical principles are common to the field and even less agreement on how to proceed in conducting programmatic research.

STRATEGIES FOR TEACHING AT A DISTANCE

Classroom teachers rely on a number of visual and unobtrusive cues from their students to enhance their delivery of instructional content. A quick glance, for example, reveals who is attentively taking notes, pondering a difficult concept, or preparing to make a comment. The student who is frustrated, confused, tired, or bored is equally evident. The attentive teacher consciously and subconsciously receives and analyses these visual cues and adjusts the course delivery to meet the needs of the class during a particular lesson.

In contrast, the distant teacher has few, if any, visual cues. Those cues that do exist are filtered through technological devices such as video monitors. It is difficult to carry on a stimulating teacher-class discussion when spontaneity is altered by technical requirements and distance.

Without the use of a real-time visual medium such as television, the teacher receives no visual information from the distant sites. The teacher might never really know, for example, if students are asleep, talking among themselves or even in the room. Separation by distance also affects the general rapport of the class. Living in different communities, geographic regions, or even states deprives the teacher and students of a common community link.

WHY TEACH AT A DISTANCE?

Many teachers feel the opportunities offered by distance education outweigh the obstacles. In fact, instructors often comment that the focused preparation required by distance teaching improves their overall teaching and empathy for their students.

The challenges posed by distance education are countered by opportunities to:
- Reach a wider student audience
- Meet the needs of students who are unable to attend on-campus classes
- Involve outside speakers who would otherwise be unavailable
- Link students from different social, cultural, economic, and experiential backgrounds

IMPROVING PLANNING AND ORGANIZATION

In developing or adapting distance instruction, the core content remains basically unchanged, although its presentation requires new strategies and additional preparation time.

Suggestions for planning and organizing a distance delivered course include:
- Begin the course planning process by studying distance education research findings. There are several research summaries available.
- Before developing something new, check and review existing materials for content and presentation ideas.
- Analyse and understand the strengths and weaknesses of the possible delivery systems available to you (*e.g.*, audio, video, data, and print) not only in terms of how they are delivered (*e.g.*, satellite, microwave, fibre optic cable, *etc.*.), but in terms of learner needs and course requirements before selecting a mix of instructional technology.
- Hands-on training with the technology of delivery is critical for both teacher and students. Consider a pre-class session in which the class meets informally using the delivery technology and learns about the roles and responsibilities of technical support staff.
- At the start of class initiate a frank discussion to set rules, guidelines, and standards. Once procedures have been established, consistently uphold them.
- Make sure each site is properly equipped with functional and accessible equipment. Provide a toll-free "hotline" for reporting and rectifying problems.
- If course materials are sent by mail, make sure they are received well before class begins. To help students keep materials organized, consider binding the syllabus, handouts, and other readings prior to distribution.
- Start off slowly with a manageable number of sites and students. The logistical difficulties of distant teaching increase with each additional site.

MEETING STUDENT NEEDS

To function effectively, students must quickly become comfortable with the nature of teaching and learning at a distance. Efforts should be made to adapt the delivery system to best motivate and meet the needs of the students, in terms of both content and preferred learning styles.

Consider the following strategies for meeting students' needs:
- Assist students in becoming both familiar and comfortable with the delivery technology and prepare them to resolve the technical problems that will arise. Focus on joint problem solving, not placing blame for the occasional technical difficulty.
- Make students aware of and comfortable with new patterns of communication to be used in the course.
- Learn about students' backgrounds and experiences. Discussing the instructor's background and interests is equally important.
- Be sensitive to different communication styles and varied cultural backgrounds. Remember, for example, that students may have different language skills, and that humour is culturally specific and won't be perceived the same way by all.
- Remember that students must take an active role in the distance delivered course by independently taking responsibility for their learning.
- Be aware of students' needs in meeting standard university deadlines, despite the lag time often involved in rural mail delivery.

USE EFFECTIVE TEACHING SKILLS

For the most part, effective distance teaching requires the enhancement of existing skills, rather than developing new abilities. Pay special attention to the following:
- Realistically assess the amount of content that can be effectively delivered in the course. Because of the logistics involved, presenting content at a distance is usually more time consuming than presenting the same content in a traditional classroom.
- Be aware that student participants will have different learning styles. Some will learn easily in group settings, while others will excel when working independently.
- Diversify and pace course activities and avoid long lectures. Intersperse content presentations with discussions and student-centred exercises.
- Humanize the course by focusing on the students, not the delivery system.
- Consider using a print component to supplement non-print materials.
- Use locally relevant case studies and examples as often as possible to assist students in understanding and applying course content. Typically, the earlier in the course this is done, the better.
- Be concise. Use short, cohesive statements and ask direct questions, realizing that technical linkages might increase the time it takes for students to respond.

- Develop strategies for student reinforcement, review, repetition, and remediation. Towards this end, one-on-one phone discussions and electronic mail communication can be especially effective.
- And finally...relax. Participants will quickly grow comfortable with the process of distance education and the natural rhythm of effective teaching will return.

IMPROVING INTERACTION AND FEEDBACK

Using effective interaction and feedback strategies will enable the instructor to identify and meet individual student needs while providing a forum for suggesting course improvements.

To improve interaction and feedback, consider the following:

- Use pre-class study questions and advance organizers to encourage critical thinking and informed participation on the part of all learners. Realize that it will take time to improve poor communication patterns.
- Early in the course, require students to contact you and interact among themselves via electronic mail, so they become comfortable with the process. Maintaining and sharing electronic journal entries can be very effective towards this end.
- Arrange telephone office hours using a toll-free number. Set evening office hours if most of your students work during the day.
- Integrate a variety of delivery systems for interaction and feedback, including one-on-one and conference calls, fax, E-mail, video, and computer conferencing. When feasible, consider personal visits as well.
- Contact each site (or student) every week if possible, especially early in the course. Take note of students who don't participate during the first session, and contact them individually after class.
- Use pre-stamped and addressed postcards, out-of-class phone conferences, and e-mail for feedback regarding course content, relevancy, pace, delivery problems, and instructional concerns.
- Have students keep a journal of their thoughts and ideas regarding the course content, as well as their individual progress and other concerns. Have students submit journal entries frequently.
- Use an on-site facilitator to stimulate interaction when distant students are hesitant to ask questions or participate. In addition, the facilitator can act as your on-site "eyes and ears".
- Call on individual students to ensure that all participants have ample opportunity to interact. At the same time, politely but firmly discourage individual students or sites from monopolizing class time.
- Make detailed comments on written assignments, referring to additional sources for supplementary information. Return assignments without delay, using fax or electronic mail, if practical.

CORRESPONDENCE STUDY TO DISTANCE EDUCATION

In 1982, the International Council for Correspondence Education changed its name to the International Council for Distance Education to reflect the developments in the field. With the rapid growth of new technologies and the evolution of systems for delivering information, distance education, with its ideals of providing equality of access to education, became a reality. Today there are distance education courses offered by dozens of public and private organizations and institutions to school districts, universities, the military, and large corporations. Direct satellite broadcasts are produced by more than 20 of the country's major universities to provide over 500 courses in engineering delivered live by satellite as part of the National Technological University (NTU). In the corporate sector, more than $40 billion a year are spent by IBM, Kodak, and the Fortune 500 companies in distance education programmes.

What, exactly, are the prospects and promises of distance education? Desmond Keegan identified six key elements of distance education:

- Separation of teacher and learner
- Influence of an educational organization
- Use of media to link teacher and learner
- Two-way exchange of communication
- Learners as individuals rather than grouped
- Educators as an industrialized form.

Distance education has traditionally been defined as instruction through print or electronic communications media to persons engaged in planned learning in a place or time different from that of the instructor or instructors. The traditional definition of distance education is slowly being eroded as new technological developments challenge educators to reconceptualize the idea of schooling and lifelong learning. At the same time, interest in the unlimited possibilities of individualized distance learning is growing with the development of each new communication technology. Although educational technologists agree that it is the systematic design of instruction that should drive the development of distance learning, the rapid development of computer related technologies has captured the interest of the public and has been responsible for much of the limelight in which distance educators currently find themselves. Although the United States has seen rapid growth in the use of technology for distance education, much of the pioneering work has been done abroad.

OPEN LEARNING IN THE U.K.

The establishment of the British Open University in e United Kingdom in 1969 marked the beginning of the use of technology to supplement print-based instruction through well-designed courses. Learning materials were delivered on a large scale to students in three programmes: undergraduates, postgraduates, and associate students. Although course materials were primarily print based, they were supported by a variety of technologies. No formal educational

qualifications have been required to be admitted to the British Open University. Courses are closely monitored and have been successfully delivered to over 100,000 students. As a direct result of its success, the Open University model has been adopted by many countries in both the developed and developing world. Researchers in the United Kingdom continue to be leaders in identifying problems and proposing solutions for practitioners in the field.

The International Centre for Distance Learning, at the British Open University, maintains the most complete holdings of literature in both research and practice of international distance learning. Research studies, evaluation reports, course modules, books, journal articles, and ephemeral material concerning distance education around the world are all available through quarterly accessions lists or on line.

DISTANCE EDUCATION IN THE UNITED STATES

The United States was slow to enter the distance education marketplace, and when it did, a form of distance education unique to its needs evolved. Not having the economic problems of some countries or the massive illiteracy problems of developing nations, the United States nevertheless had problems of economy of delivery. Teacher shortages in areas of science, math, and foreign language combined with state mandates to rural schools produced a climate, in the late 80s, conducive to the rapid growth of commercial courses such as those offered via satellite by the TI-IN network in Texas and at Oklahoma State University. In the United States, fewer than 10 states were promoting distance education in 1987. A year later, that number had grown to two-thirds of the states, and by 1989 virtually all states were involved in distance learning programmes.

Perhaps the most important political document describing the state of distance education has been the report done for Congress by the Office of Technology Assessment in 1989 called Linking for Learning (Office of Technology Assessment, 1989). The report gives an overview of distance learning, the role of teachers, and reports of local, state, and federal projects. It describes the state of distance education programmes throughout the United States in 1989 and highlights how technology was being used in the schools. Model state networks and telecommunication delivery systems are outlined with recommendations given for setting up local and wide-area networks to link schools. Some projects, such as the Panhandle Shared Video Network and the Iowa Educational Telecommunications Network, serve as examples of operating video networks that are both, efficient and cost effective.

EDUCATIONAL EXPERIMENTS AND CHANGE

Alternatives to traditional higher education emerged in the U.S., in the 1960s and 1970s. Trends such as escalating college costs, a renewed interest in nontraditional education by a more mobile population, and success of Britain's Open University paved the way for numerous experiments in higher education.

Programmes such as the University Without Walls, external degree programmes, and imitations of the British Open University were encouraged by large grants from the Carnegie Commission on Higher Education.

The instructional technology movement was defining its purpose during the late 1960s and moving further away from equating instructional technology with audio-visual devices. In 1970, the Department of Audiovisual Instructional changed its name to the Association for Educational Communication and Technology, and defined educational technology as "a field involved in the facilitation of human learning through the systematic identification, development, organization, and utilization of a full range of learning resources....(AECT, 1972, pp. 36-37). The same period saw an increased attention to instructional technology and "systems" approaches to the design of instruction based on theories of cognitive psychology and individualized instruction. Distance education programmes which exist today have a wide range of approaches.

The CALS programme offers independent study courses through computer networking and relies heavily on computer-based student contact and feedback. Nova University offers computer-delivered instruction; and the students communicate with instructors through electronic mail, attend some concentrated centralized class sessions, and meet in weekend cluster groups. The Mind Extension University offers undergraduate and graduate degrees through cable networks, and it supplements video courses with texts and other collateral materials.

In summary, the history of distance education shows a field that appears to be in a constant state of evolution, that is supported by theory, but in need of research which can fill many unanswered questions. The historical view of distance education shows a stream of new ideas and technologies balanced against a steady resistance to change, and it often places technology in the light of promising more than it has delivered. History shows nontraditional education trying to blend with traditional education while striving to meet the challenge of constantly changing learning theories and evolving technologies.

A BRIEF HISTORY OF DISTANCE EDUCATION

Throughout the history of human communication, advances in technology have powered paradigmatic shifts in education. Communication between teacher and student is a vital element of successful distance education. Media has played an essential role in the establishment of teacher and student communication. For communication to take place, at a bare minimum, there must be a sender, a receiver, and a message. If this message is intended as an instruction, then besides student, teacher, and content, we must consider the environment in which this educational communication occurs (Berg & Collins, 1995). Moore (1990) sees the success of distance education to be based on the content of the dialog between teacher and student and the effectiveness of the communication system in an educational process.

There are some discussions about the frequencies and nature of dialogue. Hoffman (1995) referred to dialogue as the capacity for teacher and student to respond to one another.

During the nineteenth century, in the United States, several activities in adult education preceded the organization of university extension beyond campuses. In 1873, Anna Ticknor created the society to encourage studies at home for the purpose of educational opportunities for women of all classes in the society. This Boston-based, largely volunteer effort provided correspondence instruction to 10,000 members over a 24-year period despite its resolutely low profile. Printed materials sent through the mail were the main way of communication, teaching, and learning. In 1883 a Correspondence University headquartered at Cornell University was established, but never got off the ground. The first official recognition of education by correspondence came from 1883 to 1891 by Chautauqua College of Liberal Arts. This college was authorized by the state of New York to grant academic degrees to students who successfully completed work at the Summer institutes and by correspondence during the academic year. Interest regarding the effectiveness of correspondence study verses traditional study was the subject of debates and discussions. Watkins (1991) wrote that William Rainy Harper, professor of Herbrew at Yale University, who was authorized from 1883 to 1891 to grant degrees to students who completed correspondence study, believed that correspondence study "would not, if it could, supplant oral instruction, or be regarded as its substitutes." Watkins (1991) in her book cited that Vincent (1885) wrote, the day is coming when the work done by correspondence will be greater in amount than that done in the classrooms of our academics and colleges; when the students who shall recite by correspondence will far outnumber those who make oral recitations.

Vincent's vision brought a new way of thinking about the value and future of distance education for institutions. Watkins (1991) explained that leadership for the development of university-level extension throughout the nation was provided by Herbert Baxter Adams, the foremost historian of his day. His enthusiasm for the extension movement was a positive force for his students at John Hopkins University. Ultimately, his students would carry on his extension work across the country.

Correspondence study has grown in popularity, acceptance, and effectiveness. In 1915, creation of the National University Extension Association(NUEA) broadened the focus to other issues, such as necessity of new pedagogical models and new national level guidelines, such as university policies regarding acceptance of credit from correspondence courses, credit transferal, and standard quality for correspondence educators.

The University of Chicago faculty survey findings in 1933, suggested that correspondence study should be justified on an experimental basis, generating innovations and research data leading to improvements in teaching methodology. This research study was very important for the future knowledge base in this field. The medium of mail was a dominate delivery system for over forty years,

but new delivery technologies started to provide additional options for correspondence study. Pittman (1986) wrote, visual instruction, including lantern slides and motion pictures was added to the repertory of many extension units in the period of 1910-1920, but most promising new technology for correspondence instruction was instructional radio.

In the years between the World Wars (1918-1946), the federal government granted radio broadcasting licenses to 202 colleges, universities, and school boards. With all the demands and popularity of instructional radio, by the year 1940 there was only one college-level credit course offered by radio and that course failed to attract any enrollments. Still, the concept of education by radio was a major reason for development of educational television by the mid 20th century. More and more association and social support developed for distance education around the country. Packing companies, railroads, the American Banking Association, Labour Unions, Army and Navy, and state and national welfare associations recognized the merits of correspondence instruction. With the growth of popularity and needs for correspondence study, new questions such as learners' characteristics, students' needs, effectiveness of communication, and value of outcomes in comparison with face-to-face study became public interests. From the pursuit of answers to these questions emerged needed research initiatives such as Gale Childs' (1949) dissertation studying the effectiveness and reliability of correspondence study as an educational method. The interest in finding answers for these questions was the reason for many new research studies which have contributed to the growth of the knowledge base of distance education. Clark (1996) wrote, "the studies of improvement of teaching by using media have been part of educational research since Thorndike (1912) recommended pictures as a labour-saving device in instruction." In response to wartime needs, extension programmes also provided a variety of technical and mechanical training opportunities, as well as short courses and refresher courses. After World War II, television was considered as another delivery option in the correspondence study.

In the early 1950s, despite the efforts of leaders in the field, correspondence study struggled to gain acceptance, and it was still seen as suspect by academics. During this period, research helped to further the acceptance and extension of correspondence study. As Childs (1973) indicated, little research existed to support the apparent and perceived strengths of the methodology, and there was little or no sense of professionalism. During the fifth International Conference on Correspondence Education (ICCE), in Alberta, Canada, delegates from universities, governments, and proprietary institutions reflected a growing interest in the research of correspondence study (National University Education Association. Over the past half century, the Ford Foundation has played an important role in the development and support of area and international studies within American higher education. With a Ford Foundation grant, Childs initiated a project, in 1956, to study the application of television instruction in combination with correspondence study. From this important and needed study, Childs

concluded "television instruction is not a method. Television is an instrument by means of which instruction can be transmitted from one place to another". Childs also found no appreciable differences in regular classrooms by means of television, or by a combination of correspondence study and television.

During the 1960s and 1970s, a number of alternatives to traditional higher education developed in the United States. The major reasons were broad national trends that included rapidly escalating costs of traditional resident education, interest in informal and nontraditional education, an increasingly mobile American population, the growth of career-oriented activities, necessity of learning new competencies, public dissatisfaction with educational institutions in general and the early success of Britain's Open University.

Britain's Open University brought a new vision of independence for distance education as distinct from traditional education. Britain's Open University played a major role in the development of much of the important research in distance learning. Britain's Open University is the largest and most innovative educational organization in the world. It is a leader in the large-scale application of technology to facilitate distance learning. Open University brought the needed respect and confidence to the correspondence programme around the world.

The success of Britain's Open University was the major reason for the development of open universities in other countries, such as America and Japan. Open University not only overcomes the restrictive concept of place and time, but also eliminates the boundary of nations and nationalities. There are more than 218,000 people currently studying with the Open University, and the principal qualifications awarded by this university are BA, and Bsc degrees, Masters, an MBA, and research degrees including Bphil, Mphil, and PhD (Open University, 1996).

The first United States open university was New York State's Empire State College (NYSES), which commenced operation in 1971. One of the main purposes of the NYSES was to make higher education degrees more accessible to learners unable to attend traditional programmes, campus-based courses. The programme in NYSES modified the concept of academic credits and provided a greater flexibility regarding degree requirements and time limitations than was characteristic of tradition-based degree programmes. Providing a direction for advancement of research activities in distance education was a major concern of leaders in this field. Two individuals who played major roles in the advancement of the state of scholarly research in the field are Charles Wedemeyer of the University of Wisconsin and Gayle Childs of the University of Nebraska. Wedemeyer and Childs made major contributions in the transformation of correspondence study into a profession. Both played major roles in the advancement of distance education research. They were recognized as leaders of the movement throughout the 1950s, 1960s, and 1970s. Wedemeyer and Childs not only provided needed leadership to their universities correspondence programmes, but also provided direction for the national and international growth of this method of teaching and learning. Both men made

major contributions in the Correspondence Study Division of the NUEA and Internal Conferences on Correspondence Education. Wedmeyer and Childs publications, books, and films on correspondence study have provided teachers and students with an invaluable source of process design, teaching, and learning.

In mid 1960, the development of the Correspondence Education Research Project was a major hope for more research activities and definition of the status of the correspondence study in American higher education. In 1968, the division of Correspondence Study changed its name to the Division of Independent Study; this new division provided more options for delivery of education in the form of videotape, programmed instruction, television, telephone, and other multimedia teaching and learning (National University Extension Association. In the last 20 years, with the advancement in technology, independent study has become more accessible for distance education students. Zigerell (1984) wrote, "the ease with which modern communications technologies can link educational institutions to homes, work-sites, and community centers has made adult education and lifelong learning matters of national policy" (P. 53). At the same time, the loads and responsibilities of adults have become of interest to experts and educators in distance learning.

Feasley (1983) stated that individuals who must learn at a distance have ongoing obligations such as employment, family responsibilities, handicaps, or live in geographically isolated area. The 1970s and 1980s introduced the related concept "distance education" which posed new challenges to traditional independent study, forcing a reexamination and redefinition of the place of independent study in this new international movement.

In the late 1970s and early 1980s, cable and satellite television came into use as a delivery medium for distance education courses. During the 1980s, many quality telecourse offerings were available by using cable and satellite delivery.

But as Munshi (1980) said, "unfortunately, systematic efforts to evaluate telecourses have been the exception rather than the rule." In the Fall of 1991, eighteen institutions, including the University of California, the University of Oklahoma, Penn State, and Washington State, used the Mind Extension University (MEU), Educational Network to deliver video course materials for independent study courses (MEU catalog, 1991).

Women's desire and participation in distance education helped the growth of distance education in the 1980s and 1990s. The report of the survey of telecourse enrollments in five states showed 67% of the participants in the distance education were women(Instructional Telecommunication Consortium, 1984). Participation of women in distance learning was directly related to political and social changes in women's position within the family and society, technological changes in the work place, and the economic necessity of participation, and the job market and new job opportunities.

The research activities of Britain's Open University provided new directions and emphasis for more research in this field. Publication of Research in Distance

Education in 1989 provided great opportunity to collect information about ongoing research projects and the results of current research in the field of distance education. Until the arrival of this new periodical, most research institute descriptions were found in sources difficult to access in the United States (Moore, 1985; Rumble & Harry, 1982).

Coldeway (1982) identified the following reasons for the limitation of research activities in distance education.

1. Educational researchers are rarely present during the design of distance learning systems.
2. There is no clear paradigm for research in distance learning, and it is difficult to attract funds to develop one.
3. Some institutions are averse to defining boundaries and variables clearly.
4. Educational researchers often ask questions of no practical or even theoretical relevance.
5. Researchers in the distance learning test variables that are really classes of variables (such as comparisons of distance and classroom learning).

Advancement in telecommunications and computer technologies will speed up national and international cooperation in both research and documentation. Technology makes the process of research, collection of data, analysis of data, and generation of reports easier and faster. Calvert (1986) provided a helpful conceptual framework for distance education research by identifying three principal kinds of variables: input, process, and outcome. The input and outcome variables can be divided into student or system variables, and process variables are divided as either development or delivery variables.

With the increase in demand for distance education, the growing concerns were knowledge about effectiveness of distance education and changes in pedagogy enabled and required by the advancement of technology. A recent American Federation of Teachers (AFT) task force report states that too little is known about the effectiveness of distance learning and that more independent research is needed. At the same time, Clark (1996), in his paper mentioned that media forms are mere vehicles that deliver instruction, but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition. Clark believes that it is not media, but variables such as instructional method that foster distance learning.

Even with the growth in the amounts of distance education in our higher educational institutions, few studies examined students learning experiences, effectiveness of instructional methods, and strengths and limitation of this model of teaching and learning.

Russell (1996), Office of Instructional Telecommunications at North Carolina State University, provided brief quotations from 218 research reports, summaries, and papers, from 1945 to the present that compare technology-driven education methods with traditional classroom instruction.

The compiled citations and quotations indicate that students learn equally well from education delivered by technology as measured by these 218 reports

at a distance and face-to-face. In addition to the effectiveness of learning experiences, the reasons for learners' participation in distance education are another attractive topic of systematic investigation by researchers.

Wallace (1991) in her dissertation, Faculty and Student Perceptions of Distance Education Using Television(TV), provided rich information about the reasons adults participate in the TV education. Her conclusion of study revealed the reasons for participation were opportunity to earn an MBA (90.9%), opportunity to upgrade work skills (75.1%), and the opportunity to learn more about business concepts (83.2%).

Her finding was a strong display of the objectives of participants in the adult continuing education. Most students participating in TV programmes found their courses to be challenging and had favourable experiences with technology. Wallace's recommendation for additional investigation includes: further research in educational resources and training needs of both students and teachers, attitudes of faculty towards distance learners, evaluation of educational experiences with regards to lack of personal interaction in the group, and follow-up study for comparison of performance of this group with face-to-face class students. Wallace also recommended that incorporating the electronic mail system with TV education can facilitate better communication between students and teacher.

The main finding of the Wallace study is that continuing education is necessary for better job performance and advancement in the job market. Her recommendation for combining asynchronous technology(e-mail) with synchronous technology (TV), and training needs of distance education students and teachers are major issues in the distance education programme.

ASSESSMENT OF LEARNING OUTCOMES

Learning and learner performance have to be appropriately assessed. Again, a wide range of strategies may be applied as part of this process. The choice of these will vary according to the intended learning outcomes and the learning tasks that were prescribed. For example, if the nature of the learning task was more collaborative, situated and distributed in its context, conventional methods of assessment of learning outcomes would be inadequate.

These will need to be replaced by cognitive tasks and assessment procedures that can focus on the processes of learning, perception, and problem solving. In addition, assessment could no longer be viewed as an add-on to an instructional design or simply as separate stages in a linear process of pretest, instruction, and posttest. Assessment must become an integrated, on-going, and seamless part of the learning environment.

The entire instructional design process will need to be changed from a serial stage model in which assessment enters and leaves, to a model in which processes that serve as instructional stimuli also serve to provide data to a multivariate model. Such a model would then be able to provide important feedback to both the instructor and the learner.

Assessment focusses on the learning process as well as the learning products. For instance, if learning changes from direct instruction to situated learning the assessment of successful and less successful learners (or experts and novices within a domain) must change from an emphasis on right and wrong responses towards an emphasis on the information that each student perceives in the situations. Meanings that each student perceives could be detected by types of information to which they attend (*e.g.*, replayed video scenes), paths taken towards solution, types of analogies and transfer that occur, and the types of errors that are made. These new sources of data will require more elaborate (multivariate and nonlinear) models.

FEEDBACK AND REMEDIATION

Any instructional system which views learning as a process of mutual influence between learners and their instructional resources must involve some feedback for, without feedback, any mutual influence is by definition impossible. From a review of research on effects of feedback in written instruction Kulhavy (1977) described four conditions of feedback: (a) that feedback corrects errors; (b) that the error-correcting action of feedback is more effective when it follows a response about which the learner felt relatively certain; (c) that the effectiveness of feedback is enhanced if it is delivered after the learner has made a response; and (d) that, if feedback is to be effective, its availability in advance of learner response must be controlled. It has been reported though that feedback delivered following learner response is beneficial only under controlled and somewhat artificial conditions (Kulik and Kulik, 1988). There is some evidence also that the amount of information in feedback is unrelated to its effects, and that feedback does not always increase achievement and is sometimes associated with decreased achievement (Bangert-Drowns, Kulik, Kulik and Morgan, 1991).

From these general assessments of the effects of feedback, several conclusions can be drawn about conditions of feedback. Foremost among these is that feedback is not a unitary phenomenon and that it may differ in several ways. First, feedback may differ according to its *intentionality*. This refers to whether feedback was designed to inform learners about the quality and accuracy of their responses, or it happened to be an *incidental* consequence of the instructional environment. Intentional feedback is typically found in direct and expository instructional settings, although informal feedback in such contexts has an important function in instructional events such as peer group interactions and unassisted group simulations.

Intentional feedback can be further differentiated according to the manner in which it is delivered. It may be delivered via direct interpersonal communication between instructor and learners or between learners. Alternatively, intentional feedback may be delivered in mediated forms such as telephonic and computer-based communication systems. In any event, intentional feedback is highly specific and directly related to the performance of the task. Secondly, feedback can be distinguished according to its *target*. Some feedback is primarily designed

to influence affective learning capacities such as intrinsic motivation. Feedback may be directed at supporting self-regulated learning activity by cueing on to the self-monitoring processes of the learner. Most commonly, though, feedback is targetted at indicating whether learners have performed the specified tasks or applied the learned concepts and procedures correctly.

Thirdly, feedback is distinguishable according to its *content,* which is identifiable by: (a) *load* (*i.e.*, the amount of information given in the feedback from yes-no statements to fuller explanations); (b) *form* (*i.e.*, the structural similarity between information in the feedback compared to that in the instructional presentation); and (c) *type of information* (*i.e.*, whether the feedback restated information from the original task, referred to information given elsewhere in the instruction, or actually provided new information.

Following from the above, and the work of their predecessors with feedback, Bangert-Drowns et al. (1991) developed a five-point model for conceptualising the effects of feedback. According to this model, learners come into an instructional context in some state which is manifested by their interests, goals, degree of self-efficacy, and relevant prior knowledge. Upon commencing instruction, search and retrieval strategies are activated during or following the process in numerous ways. Learners respond to these activities and evaluate their responses on the basis of subsequent feedback. After this response evaluation, learners are in a position to make adjustments to their knowledge, level of motivation, and assessment of self-efficacy.

EVALUATION OF INSTRUCTION

The validity of an evaluation project, whether it is formative or summative, will be enhanced if it is undergirded by one or more theoretical orientation(s). This has to do with the function or purpose of the evaluation exercise (*i.e.*, whether it is aimed at decision-making or assessment of the impact of the instruction on student learning). The variety of approaches to evaluation activity following from a review by Borich and Jemelka (1982) are briefly summarised. These are as follows:

Decision-oriented evaluation: Proponents of this approach to evaluation include Stufflebeam et al. (1971) and Provus (1971). The focus of this perspective is comparing 'what is' with 'what should be'. The approach has been criticised for its limited scope and lack of objectivity.

Value-oriented evaluation: This approach has been also described as the 'humanistic approach'. It stresses the value judgements made in evaluating programmes (*i.e.*, the merit or worth of programmes). It is inherently humanistic in nature, focusses on the total effect of the programme, product or process and is sensitive to unknown or unintended programme effects. A notable exponent of this approach is Scriven (1973) who has proposed the idea of 'goal-free evaluation'.

Naturalistic evaluation: This approach aims at discovery and verification through direct observation, as in ethnography. It relies on impressionistic

accounts of evaluators *in situ* who do not manipulate the conditions antecedent to their enquiry and they pose minimal constraints on the behaviour of their participants. There are a number of variations of the naturalistic approach.

- The responsive model serves the requirements of the audience and focusses on important issues pertaining to the programme or process.
- The judicial model (Wolf, 1979; Owens, 1973) best serves an adversarial setting.
- The transaction model serves to deal with management conflicts and institutional change as a result of the innovation.
- The connoisseurship model as in wine tasting, for instance, depends on fine judgement.
- The illumination model (Parlett and Hamilton, 1976) relies on open-ended observations but also questionnaires, interviews and tests to illuminate a scenario.

Systems-oriented evaluation (Kaufman and English, 1979): This approach basically identifies discrepancies between 'what should be' and 'what is', and uses these discrepancies to provide direction for programme development. It also seeks to determine whether the desired state has been achieved. Central to the systems approach is the blending of the humanistic and behaviouristic principles.

Utilisation-focussed evaluation: The basic premises of this approach are as follows:

- Concern for utilisation should be the driving force in an evaluation;
- Concern for utilisation is on-going and continuous from the very beginning of the evaluation;
- Evaluations should be user-oriented;
- Intended users should be actively involved in the evaluation process;
- There are varied and many interests around any evaluation activity.

Depending on the perspectives adopted for evaluation, data may be collected with any one or more of a range of instruments including questionnaires, opinionnaires, checklists, attitude inventories, open-ended responses, individual and focus group interviews, *etc.*

CONCLUDING REMARK

A review of existing work on applying learning and instructional strategies in open and distance learning contexts reveals that much of it does not offer any specific guidelines to the developers of instructional materials. This paper attempts to address that deficiency by proposing a five-part framework called an 'instructional transaction'. The five parts in the transaction are *one,* presentation of instructional content; *two,* activation of student learning; *three,* assessment of learning outcomes; *four,* provision of feedback and remediation; and *five,* evaluation of the instructional effect.

These five parts of the transaction comprise the essential building blocks of an instructional event. They are derived from existing research on various

elements of the teaching and learning process. Neglect in any one of these areas has the potential to weaken the instructional process and interfere with learning. On the other hand, careful attention to each of the five elements has the potential to produce strong instruction and enhanced learning capability.

Existing literature on the design and development of self-instructional study materials such as those required for open and distance learning is somewhat fragmented. The five-part framework proposed in this paper adds to this existing work by consolidating the bulk of it into a usable working strategy for instructional designers and course writers. The framework is general enough to include much of what is known about teaching and learning, and in this regard it can be seen as an 'instructional development shell' which offers the designer a developmental model to follow. It is also specific enough to provide the novice instructional designer with not only a developmental procedure but examples of specific learning and instructional strategies for actually building a piece of instruction.

This, then, is the principle contribution of the five-part framework and of the paper. The framework has to be used with the literature that is reviewed and summarised in the paper in order for it to be meaningful. The examples of learning and instructional strategies suggested for each of the phases of the transaction are certainly not exhaustive. One should add to it or delete from it depending on one's particular circumstances. Finally, while the five-part framework presented might seem to represent the instructional process as a linear one, in fact, it isn't. The instructional process is an iterative one, and one that should be always learning from its own experiences, never in fact able to reach the ideal state or perfection, for there is no such thing as 'perfect instructional practice', only excellent instructional practice.

DISTANCE EDUCATION
THEORY AND PRACTICE

Distance Education Theory and Practice is a comprehensive exploration of the principles, methodologies, and applications underlying remote learning modalities. This field encompasses various modes of instruction, including online courses, virtual classrooms, and correspondence programs, facilitating access to education for learners separated by geographical distances or other barriers. The book delves into theoretical frameworks such as transactional distance theory, social presence theory, and cognitive load theory, providing insights into how distance learning environments influence student engagement, interaction, and achievement. Moreover, Distance Education Theory and Practice examines the practical aspects of designing, implementing, and evaluating distance education programs. It discusses instructional design models, technological tools, and pedagogical strategies tailored to the unique needs and challenges of remote learners. Case studies and best practices offer valuable examples of successful distance education initiatives across various disciplines and educational contexts. Through a blend of theoretical insights and practical guidance, Distance Education Theory and Practice equips educators, policymakers, and instructional designers with the knowledge and tools needed to harness the potential of distance learning and create engaging and effective educational experiences for learners worldwide. The book also addresses issues related to learner support, including advising, tutoring, and assessment, to enhance student retention and success in distance learning environments. Furthermore, it explores the role of instructors and administrators in fostering a supportive and inclusive learning community, leveraging communication platforms and collaborative tools to facilitate meaningful interactions and promote social learning experiences.

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