CHAPTER- II

REVIEW OF LITERATURE

2.1 Introduction

The rationale along with the objectives of this research work has been given in the previous chapter. The present chapter is devoted to the review of literature. There has been a substantial body of research material related to different aspects of the use of Information and Communication Technology (ICT) in Higher Education. For ease of understanding, the researches are being given under headings, such as, Constituents of ICT, Role of ICT in Higher Education, Global Trends in Educational ICT Practices, Use ICT in Teaching and Learning, Use of ICT in Libraries, Use of ICT in Organization and Management of Higher Education, and ICT in Distance Education.

2.2 Constituents of Information and Communication Technology

Academic commentators, policy makers, and technology practitioners use various concepts when talking about a technology, and most concepts often reflect the purpose for which a technology is used. References are often made to IT Networks and Communication Protocols (University of Natal, 2003), Electronic Information and Communication Technologies (Van der Merwe and Pool, 2002) among other concepts. Where ever the context refers to the educational usage, references are made to Educational Technologies (UCT, 2003), Learning and E-Learning Technologies (Badenhorst and de Beer, 2004), Online Teaching and Learning Technologies (Van der Merwe, and Möller, 2004), Digital Library Technologies (Peters, Dale (CITTE, 2002:3), and Digital Learning Objects (Smith, R.S, 2004). Technology is also viewed...
within the context of communication, and seen as communication tools and networks.

Most authors, however, take for granted that the meaning of these concepts are known and never tried to define them. Wherever such concepts are defined, almost all definitions tend to link technology with knowledge: either as knowledge itself or the technical means of doing things (which implies knowledge) (Bergen.org), as a tool to advance knowledge, or as a domain of knowledge for specific purposes (that is knowledge advancement). Educational technology generally “encompasses computers, software, video, communications, interactive video, satellite communications, television, video, robotics, CD-ROM, and the Internet” (among other things). “It includes the knowledge and skills necessary to use technology as a tool” (ibid).

2.3 Role of ICT in Higher Education

According to Rosenberg and Steinmueller (1982), ICT intervention meets an educational need, and that it adds value to an educational activity. They advocate for ensuring that it is the most appropriate intervention for the given context, and that it would be sustainable in the long term. Further, they argued in their examination of the economic impact of a development in electronics - Very Large Scale Integration (VLSI) that the diffusion of a technology (VLSI diffusion in their case) depends on knowledge, costs, and its value-added capabilities. Their point was that there was a strong link between social (consumer) needs, value added capacities of a technology, and its cost efficiency relative to all thought alternatives if the intervention is to be worthwhile.

According to Alavi (1994) many educators, students, and employers intuitively felt that the integration of the computer into the teaching would enhance learning. This would increase the student’s ability to apply knowledge and skills to future problem solving situations.
Hawkins, R. J (1998) of the World Bank Institute outlines “Ten Lessons for ICT and Education in the Developing World”. Technology, according to Hawkins, motivates students and energizes classrooms, and it also “empowers girls”. Hawkins argued for the development of computer laboratory in higher education institutions in developing countries. They may take time and money, “but they work” well in improving access and usage. But “technical support cannot be overlooked...” he added.

UNESCO (1998) observed that the rapid breakthrough in new information and communication technologies would further change the way knowledge was developed, acquired and delivered. It was also important to note that the new technologies have offered opportunities to innovate on course content and teaching methods and to widen access to higher learning.

Thomas Roswell (1999) said that ICT enhanced Higher Education in a number of ways. It enabled the effective storing/sorting of information, and offered new and fast ways of communication; the reduction of information quantity towards a higher quality and better structure; and integrated into teaching and learning strategies and used to support relative learning theories.

Bowen, William G. (2000) observed that "Many walls created by distance, time zones, and the need to work directly with physical objects were breached, and there was much more to come as new technologies emerged and the costs of hardware, software, and connectivity continued to fall." An example would be research – which was essentially one of the leading Higher Education functions and which benefitted immensely from electronic journal archiving whose access defies distance, time, and space. The facility further improved library administration as manual controls were reduced, and enhanced distant learning.
Gallivan (2001) argued that organizational adoption and assimilation of technological innovations only can be fully understood when an organizational, managerial and an individual perspective is combined in a study of the change processes. The three main actions such as selection of technology, adaptation of the technology and change of teaching and learning practice are interrelated and are not to be regarded as discrete steps following each other in a distinct order. Even though teachers, in an overall perspective, move towards a change of practice, there seem to be dynamically shift between considerations concerning selection of ICT, adaptation of ICT and change of practice with ICT throughout the implementation process. Each of the three actions has been analyzed using the basic structure of an activity as a framework.

Brown, David G. (2002) argued that computers enhanced teaching and learning by providing opportunities for presentations, practice and analysis, and by providing more access to source material via Internet. Computers and Internet connectivity was found to enhance communication and interaction between colleagues, within faculties, between classmates, and between faculties and students.

Collis and Van der Wende (2002) conducted a survey on the use of ICT in higher education and it was found that, in general, institutions were changing from a period of mostly bottom-up experimentation to institution-wide encouragement of the use of ICT. With the help of a three-stage model, it explained that in many analyzed cases the first stage of institution-wide ICT implementation, i.e. the establishment of institution-wide technological infrastructure, was in place. The second stage, i.e. rich pedagogical use of this infrastructure, was still in development. The third stage, to be labelled as strategic use of ICT with a view to the different target groups of higher education, was not considered explicitly yet.
The reasons for this low level of diffusion and integration of new technologies are many. As a consequence, the need for an institutional e-Strategy was moved into the limelight of current discussion on e-Learning in the higher education sector - a strategy to integrate ICT in a sustainable way into the work structure of the universities. The strategic use of ICT in the teaching and learning process as one core task of universities requires explicit reflection and decision-making at the institutional policy level.

But the strategy decisions related to ICT use also faced some serious obstacles. In broader terms, European university management was not professionalized and did not possess the power to define and implement a normative e-Strategy into all levels of the quite fragmented organizational structures. In organizational theory, quite some attention was devoted to “the university” as a complex organisation and significant concepts and behaviour patterns, such as, “loosely-coupled systems”, “garbage-can decision making” and even “organizational anarchy” indicated the structural weaknesses of universities (Birnbaum, 2000; Enders, 2003; Pellert, 1999). In addition, it seemed that in a broader sense, neither the topic of e-Learning nor the quality aspects of teaching and learning were currently the core priorities of much of the university leadership in European higher education.

Keats, Derek (2003) found that when used wisely, ICT, such as, Internet can help unite people and create powerful and synergistic partnerships at local, regional and global scales. The use of Internet has enabled the formation of various forms of virtual universities within and between countries across the globe. The point here was that as a communication medium that cannot be limited by time and space, Internet was enabling new local and global education synergies on teaching and learning -- for enhanced Higher Education to unlimited audiences, beyond time and distance boundaries, easily and conveniently.
Frances Cairncross and Kaija Põysti (2003) conducted a study on ICTs for education and building human capital. They found that universities fall into three broad categories. Many conventional universities in rich countries used computers in the ways that schools do—as a teaching tool or to improve the efficiency of communicating with students and of administration. For developing countries, one of the most important uses of ICTs in universities was one that also applied in schools: as an inexpensive way to gain access to teaching materials, which were expensive to create. In rich countries, ICTs were now widely used in university classrooms. In the United States in particular, university students frequently had access to computers in classrooms. Sometimes, the university provided personal computers (PC), but increasingly, the installation of wireless loops allowed students to use their own laptops for access to the Internet anywhere in the university buildings, including in classroom. Although these were widely used for teaching scientific subjects, anecdotal evidence suggested that they were less useful for teaching other courses. Instead, lecturers were growing used to the idea that they have to compete with the Internet and e-mail for their class attention.

2.4 Global Trends in Educational ICT Practices

Dalrymple and Harvey (2002) found that there is a close nexus in the fundamental roles between education in Universities and knowledge management. Taking view that quality in higher education is about transforming the students, the opines that higher education should provide students with a transformative learning experience. Nelson (2002) observed that Universities would fulfill significant functions of the society. They value learning throughout life and promote the pursuit, preservation and transmission of knowledge.
They further elaborated that Universities fulfill significant functions with regard to economy, society, environment and culture. With rapid changes and development in every aspect of the world in recent years, most universities profess a commitment to change and are confronted with formidable challenges. These include globalization, the advancement and the convergence of the information and communication technology (ICT), diversification of funding sources of higher education, and social and environmental issues.

Globalization together with ICT developments breaks the boundaries of nationhood, geography, ethnicity and culture. Universities have the opportunity to develop in global markets and join the world-wide communities. For example, the global market for international students has grown strongly and rapidly over the last 20 years.

International student enrolment in tertiary institutions rose from approximately from 710,000 to 1.54 million between 1980 and 1994 (UNESCO, 1998). Internationalization of curriculum and the demand for e-learning and e-teaching impose great pressure on universities to achieve a breakthrough in the traditional contents and forms of educational delivery.

Major challenge to universities was the emergence and growth of knowledge based economy and society, in which technological and scientific developments play a key role. ICT, networks, international competition and knowledge intensive products and services dominate economic activities (Berjerse, 2000 cited in F. Zhao, 2003). Knowledge is replacing the infrastructure and networks are replacing hierarchies in society (McShane & von Glinow, 2000). Therefore, a significant goal of universities is the development of students as competent knowledge workers.
Robin Middlehurst (2003) conducted a survey using 500 universities in commonwealth countries. The findings were: (1) Increasing faith in the power of technology was seen as enormously increasing the use of ICT in education institutions worldwide. (2) This trend led the emergence of a number of non-traditional HE providers – competing for the student population among themselves, and with the traditional university. (3) The traditional university no longer had hegemony over the provision of higher education. In rising to the new challenge, it was turning to ICT to improve the quality of its operations, and also to reach for students in destinations beyond the traditional physical boundaries. But the increasing use of ICT in higher education institutions was set within a context of wider economic, social, and political changes affecting countries world-wide. As a result, the rationales and choices made by institutions for their ICT applications influenced by a variety of macro and micro environments, and consequent perceptions of competition and the need for collaboration. Issues such as the digital divides, literacy limitations, financial constraints (largely developing countries), changes (increases) in student enrolment numbers (which was a global phenomenon), global technological developments, and competition between and among HE institutions and the emergent providers of higher education (global phenomena), were examples of the forces that drive change contexts.

2.5 Use of ICT in Teaching and Learning

Use of ICT in Teaching and Learning perhaps is the most neglected area. Bates (1991) had highlighted that there are two very different types of interactivity in learning: social and individual. Social interaction between learners and teachers need to be balanced with the individual student’s interaction with teaching-learning resources, including textbooks, study guides, audiotapes, videotapes and computer assisted learning programs. He argues that, students in
conventional institutions are engaged for the greater part of their time in meaningful, face to face interaction is a myth, and that "for both conventional and distance education students, by far the largest part of their studying is done alone, interacting with textbooks and other learning media".

Sambrook Sally (2001) reviewed the concepts of lifelong learning, work-related learning and electronic learning. Learning could also be enhanced by information and communication technologies (ICTs), including new educational and training technologies. A recent survey of employers highlighted the generally positive attitudes to electronic learning, as it was convenient and manageable (Training Zone, 2000). Benefits included greater access, reduced contact time between trainer and learner, and reduced time spent off the job. Findings from the British project highlighted that, from the learners' perspective, the most significant factor influencing attitudes to electronic learning was user friendliness.

Haddad, Wadi D. & Alexandra Drexler (2002) identified at least five levels of technology are in use in education: presentation, demonstration, drill and practice, interaction, and collaboration. Each of the different ICT—print, audio/video cassettes, radio and TV broadcasts, computers or the Internet—may be used for presentation and demonstration, the most basic of the five levels. Except for video technologies, drill and practice may likewise be performed using the whole range of technologies. On the other hand, networked computers and the Internet are the ICTs that enable interactive and collaborative learning best; their full potential as educational tools will remain unrealized if they are used merely for presentation or demonstration.

One of the most important studies on this aspect of HE is that of Nyvang Tom (2003) found that implementation of ICT in higher education learning environments was a complex task. Teachers, students, management,
administration and ICT support were affected by the implementation of ICT. To facilitate the study of the changing processes, the first step was to understand what problems and challenges implementation of ICT lead to and how it affected practice. His focus was on teachers and from that perspective implementation of ICT consisted of three interrelated processes: Selection of ICT, adaptation of ICT and change of practice with ICT. Each process presented its own challenges and goals. With the motivation for implementation of ICT by the teachers it was expected to improve quality in student learning based on a social constructivist understanding of learning.

Muse jr. (2003) felt that there was just too much hype about Web-based Learning, but less was said of technical difficulties students face, and ultimately high levels of technically motivated dropouts. The investigator interviewed a number of students who dropped out of Web-based courses; and found that most students could not obtain, access, or install all the required learning materials in a timely manner due to ICT literacy constrains, and had to drop the course while they still had a chance to do so.

The context of Fox’s study was rapid political, socio-economic, and technological change in the Hong Kong academia, which in turn was the focus of an important study, made by Pittinsky. Many internal and external pressures on universities created the need to look at teaching and learning patterns and practices from a new perspective to meet the challenges created by knowledge-based societies (Pittinsky, 2003). These pressures included a demand for a greater number of higher education places but no corresponding increase in funding (Phillips, 2005); a larger "clientele" of learners from varied backgrounds, with diverse needs, motivations, abilities, learning preferences, time availability, and course content requirements (Bates, 2004); a demand for more client responsive and flexible courses (Ryan & Stedman, 2002; McInnis & Hartley, 2003); the need to seek alternatives to government funding (Higher
Education Funding Council of England [HEFCE], 2001); and technology opportunities and the drive to use information and communication technologies (ICTs) in teaching and learning (Allen & Seaman, 2004; Challis, Holt, & Rice, 2005).

While concluding it was suggested that research need to adopt a more "heads up" (Kling, 2001) approach to integrating ICT into the universities under study. This meant a careful, considered, and planned approach, which supported changes and improvements to teaching, and learning as well as providing administrative support at both university and faculty levels. A balance needed to be established between using ICT to supplement current practice and using ICT to replace certain existing practices.

Sheard and Lynch’s (2003) study on learner diversity indicated that different students did experience and react to an online environment in different ways depending on their previous experience and that no one format met needs of all students. Therefore, constant challenges for online learning were students’ familiarity with the learning environment and their skills and confidence with the Internet and information technology. Van Soest, Canon, and Grant (2000) strongly suggested that using a Web forum could encourage dialogue among students as well as between students and the professor and thus could enhance learning within a safe environment. Designing the technology infrastructure for institutions of higher education was a strategic decision that affected the quality of the educational experience for students and faculty (Demb, Erickson & Hawkins - Wilding, 2004). In their study on students’ reactions to a campus-wide laptop computer initiative, it was found that the laptop computer was an “essential” part of college learning for students (i.e., for typing papers, accessing the Internet, searching for research references, making PowerPoint presentations, and storing information), making a significant difference in students’ study habits as well as their academic and social lives. In other words,
the laptop computer extremely helped college students with classroom assignments, e-mail messages, and individual research or projects for the course. The above study also found that student perceptions of the value of the laptop computer to their academic success were positively correlated with their perceptions of the success of faculty in integrating the laptop computer into classroom activities. However, the strength of student frustration about the cost structure of the laptop usage was one of the most striking findings.

In conclusion, Demb et al. (2004) emphasized that gaining sufficient experience with a new computer system to achieve “teaching fluency” required a substantial investment of time and attention on the part of the instructor. Online distance learning provided answers to the problems of availability (such as accessibility and cost) and the demand for flexibility (such as time, place and pace) of higher learning, and technology-mediated learning and online distance education were becoming major vehicles for fulfilling the needs of life long learning (Beller, 1998).

Bob Fox (2007) conducted a study on teaching through technology. However his study examined the use of ICT in teaching and learning contexts in two Universities in two countries and focused on teaching staff perceptions how ICTs provided benefit to learning and teaching. The study raised a number of issues that needed to be addressed before such technologies could be successfully integrated into sustainable and transferable mainstream teaching and learning practices. Further, the pressure on higher education from outside as well as inside to incorporate information and communication technologies (ICT) would continue to grow. Society expected graduates to emerge from their university experience with appropriate technology skills and abilities irrespective of the relevance of such technology to individual disciplines.
2.6 Use of ICT in Libraries

Libraries were considered to be the heart of educational institutions. These play a very important role in teaching and learning environment of the information society. The information needs and urgency in acquiring the needed information has made libraries to change rapidly. In fact the technology is changing the very nature of libraries and the librarians, and is exerting a major influence on the strategic direction of libraries in the society wherein the users want instant access to information.

Even after two decades of application of ICT in special libraries in India, it did not impact the expectations of the user community. It was crucial to know what was the status and position of special libraries in India. Three areas of research were considered to be relevant for the study: research on ICT infrastructure, studies of library automation, and the evaluation of ICT-based resources and services. Extensive researches were done in each of these areas.

2.6.1 Software Used in Libraries

There have been a number of studies that assessed the ICT infrastructure in libraries. Furness and Graham (1996) reported that 95 per cent of the special libraries in the UK used computers for some aspects of library and information services and used different software packages depending upon particular applications. Barlow and Graham (1999) found that the majority of the commercial libraries in UK used commercial online databases. Moorthy and Karisiddappa (2001) found that the majority of the libraries in India were using CDS/ISIS as the library management software. Kasirao (2000) presented that Foxpro, dBase, ORACLE, Visual Basic, and indigenous software packages were in popular use for IT application in special libraries in Chennai. Ali A. (2004) found that out of the seven
libraries in the educational media libraries in Delhi; four libraries were using locally designed software packages whereas the other three used off-the-shelf software packages. It was observed that most of the libraries needed proper computer hardware, software, and networking. Mohamed Haneefa (2006) reported that special libraries in Kerala had basic hardware facilities and they were more interested in commercial library management software. There were 11 software packages preferred by 23 libraries and CDS/ISIS was used more in libraries than any other software.

2.6.2 Library Automation

Several studies explored automation of libraries in different countries, and in different states in India. George (1994) found that the main reasons for non-computerization of libraries in Kerala were financial constrains, lack of encouragement from authorities, lack of computer awareness of the authorities, staff and users of libraries. Furness and Graham (1996) found that the library catalogue was the most popular aspect of automation in special libraries in the UK. Barlow and Graham (1999) reported that the use of purchased software packages for typical library housekeeping operations, such as cataloguing and circulation was more prevalent than in-house developed systems in commercial libraries in the UK. They also found that the library catalogue was the most popular area for automation. According to Haider (1998), the major constrains of library automation in Pakistan were absence of planning, non-availability of software, lack of competent manpower, non-existence of standards, and absence of co-operation. Moscoso and Molina (1999) reviewed the state of computerization of Spanish libraries with reference to the political and institutional support and professional commitment involved. Moorthy and Karisiddappa (2001) found that majority of the libraries in India were involved in library automation. Kumar (2003) investigated the library automation process of five university
libraries of Haryana and found that these libraries had acquired CDS/ISIS as their first library automation package.

Thapa and Sahoo (2004) found that the lack of trained professionals, negative attitude towards automation and unsatisfactory library software were some of the major reasons for the slow progress of automation of special libraries in Jabalpur. Amekuedee (2005) conducted an evaluation of library automation in some Ghanaian university libraries and found that even though the university libraries realized the importance of library automation, they were hampered by lack of funds, lack of support from the university administrations, and lack of skilled staff to embark on automation of all library processes.

### 2.6.3 Use of ICT based Resources

Adams and Bonk (1995) found that the most common barriers in the use of electronic information resources were lack of sufficient resources, the absence of information about specific resources and lack of training.

Hewitson (2000) showed a direct link between electronic information resources used and perceived Information Technology competency. It was found that the Internet was the most widely used service and electronic indexes; abstracts and electronic journals were not heavily used (Hewitson, 2002).

Moorthy and Karisiddappa (2001) found that a good number of the libraries in India were subscribing to CD-ROM databases and were willing to migrate to online journals to satisfy the demands of their users. Vicente et al. (2004) reported results of a study on the use of electronic information services by staff at Glasgow Caledonian University. It was found that the freely available
Internet was the most widely used source, which some respondents viewed as a more appropriate source of vocationally oriented information than pass worded databases. They stated that the non-use of electronic information sources was rarely due to difficulty of access or use.

Ali (2004) observed that there was a need of training library professionals to make use of the ICT based resources and services optimally. Rehman and Ramzy (2004) investigated the use of electronic information resources at the health science centre of Kuwait University and found that time constraints, lack of awareness, and low skill levels were among the primary constraints in the use of electronic information resources.

Mohamed Haneefa (2005) assessed the use of electronic information resources in special libraries of Kerala. It was found that a very few libraries were using electronic databases. Two libraries had separate digital library and only three libraries were participating in library consortia for accessing electronic journals. The budget allocations to majority of the libraries were not adequate and the IT skills and expertise of the library staff of the majority of the libraries were not satisfactory.

Mohamed Haneefa (2007) conducted a study to investigate the application of Information and Communication Technologies (ICT) in special libraries in Kerala, India. The questionnaire survey of librarians and library users, semi-structured interviews with librarians, and observational visits in the libraries methods were used to collect data for the study. This study confined only to the automated special libraries in Kerala. The analyses revealed that though the libraries had hardware, software, and communication facilities to some extent, ICT-based resources and services were not reaching the users to the expected extent. Library automation in special libraries in Kerala was largely commenced during the period 1990-2000. CDS/ISIS was used more
in the libraries than any other software. The library catalogue found to be the most popular area for automation. The ICT-based resource used by the largest percentage of the users was the e-mail.

Most of the libraries were hampered by lack of funds, lack of infrastructure, and lack of skilled professionals to embark on automation of all library management activities and application of ICT. A good number of the library users were not satisfied with the application of ICT in their libraries and indicated “inadequate ICT infrastructure” as their major reason for dissatisfaction. Some of them had an increased awareness of new technologies among the library professionals in special libraries in Kerala. Majority of the library professionals had inadequate knowledge about library automation and application of ICT.

2.7 Use of ICT in Organization and Management of Higher Education

Collis Betty & Marijk Van Der Wende (2002) conducted survey on Models of Technology and Change in Higher Education an international comparative survey on the current and future use of ICT in Higher Education, and the findings reveal that, Change is slow, and not radical. In nutshell it seems that higher education institutions do not expect revolutionary change as a result from or related to the use of ICT. In general, there is not really a concern about being forced to change by external forces or developments. Rather, a "business as usual" approach is taken, without anticipating any real dramatic changes in mission, profile or market position. They suggested that institutions that have a clearer view on their mission with respect to serving different target groups (e.g. lifelong learning or international students) with ICT and on their position in that/those particular markets demonstrate higher levels of use of ICT and influence of ICT on general teaching practice. Responses to changing demand
and strategic commitment seem to be a major drive for change in these institutions. Secondly, ICT in teaching and learning is widespread but has blended in to the institutions’ culture. ICT use, in terms of e-mail, word-processing, PowerPoint, and the Web, has become standard as part of the teaching and learning process. This has not radically affected the nature of the process; rather, ICT has become part of the blend of on-campus delivery. Thirdly, Instructors are gradually doing more, but with no reward. Instructors are not particularly concerned about ICT, and not actually changing their ways of teaching even though they use ICT in different ways. Thus, the instructor is also "stretching the mould" with ICT use as part of daily practices.

Tusubira., F. F. and Mulira., N. (2004) argued that in the African context implementation of Information and Communication Technology (ICT) services and systems in Higher Education Institutions (HEIs) generally posed challenges that, if not properly addressed, lead to heavy investment without the corresponding organizational efficiency gains. In case of majority HEIs in Africa, ICT in education and training was challenged by high maintenance that threatened sustainability of the anticipated efficiency gains. Global trends dictated a need to adopt best practices that ensured maintainability and scalability with added value. ICT was not about technology, but about organizational transformation, which needs to be understood by organizations and especially ICT professionals. ICT created an opportunity for change. All the challenges of the organisation need to be identified for which the ICT offers solutions. Such use must go hand in hand with other measures that will ensure organizational transformation.

2.8 ICT in Distance Education

Taylor James C. (1995) observed that apart from the traditional technologies such as print, broadcast television and radio, the following new technologies
provide opportunities for enhancing the quality of teaching: audiotapes, videotapes, computer-based learning packages, interactive video (disk and tape), CDTV, audio-teleconferencing, audio graphic communication systems (eg Smart 2000) and video conferencing. In recent times these technologies have been supplemented by the advent of the opportunities for interactivity and access to instructional resources provided by the computer communications networks popularly referred to as the "Internet" or the "Information Super Highway". By and large, distance educators have embraced these new technologies, while the application of such technologies to conventional on-campus education has been primarily piecemeal and rather limited.

Many institutions have evolved from using the Correspondence Model to the Multimedia Model, another significant trend is to move towards the third generation Tele learning Model of distance education (Nipper, 1989; Pelton, 1991; Taylor, 1992). This third generation of distance education is based on the use of information technologies, including audio teleconferencing, audiographic communication systems (eg Smart 2000), video conferencing and broadcast television/radio with attendant audio teleconferencing.

Kirkup (1998, 2000, 2003) and Kirkwood et al. (1996) conducted a survey on attitudes towards and use of ICT in teaching at the UK Open University (UKOU) since the mid-1990s. Changes in the behaviour and attitudes of the group seem to be parallel, and in many cases anticipate, what has happened elsewhere in higher education context. Although distance education (DE) has historically been the poor relation in higher education, it is from within DE that a great deal of the present understanding of good practice in HE teaching originated. Further, because of the potential of ICTs to improve the nature of interaction in distance education, DE teaching activity has taken the lead in many aspects of ICT use – in particular, use of the Web and computer-mediated communication. UK Government initiated campus-based universities to achieve economies of
scale for increased enrolments, and to apply systematic quality assurance methodologies to their teaching.


The emerging fifth-generation of distance education, the Intelligent Flexible Learning Model, promises to combine the benefits of high quality CD ROM based interactive multimedia (IMM), with the enhanced interactivity and access to an increasingly extensive range of teaching-learning resources offered by connection to the Internet. Though all the five generation of the distance education is in existence many of the open and distance-learning institutions are still heavily depend on the first generation of technology, i.e., print medium.

Cairncross Frances and Kaija Pöysti (2003) observed that major developments in the field of HE is implementation of the distance mode of education. Since the distance mode by definition relies on communication technology, one expects an extensive use of ICT in a distance mode of education. Surprisingly there has been very little research on the impact of ICT on distance education. Of late, the technology of distance education has become increasingly sophisticated. While many universities in developing countries rely on relatively simple technologies, such as, satellite television, others use a wide variety of techniques for distance instruction. For example, some use techniques, such as, online discussion, allowing a degree of student interaction that is impossible in print-based distance learning. If distance learning is to achieve its potential in
developing countries, inexpensive and efficient communications are essential. Technologies, such as, low-cost Wi-Fi and VSAT will gradually bring down the cost of connections for rural areas. In addition to browsing material at their own pace, students can listen to lectures through voice over-IP applications, which require less bandwidth than video conferencing.

Access to the Internet varies widely, even among countries of broadly comparable levels of income. In Asia, for example, Japan has 43.9 Internet users per 100 inhabitants; Australia has 37.1; and New Zealand 28.6. Among Asia’s poorer countries, China has 2.6 users per 100; Indonesia 1.9; and India has only 0.7. So levels of income are not necessarily the main determinants of access. High-speed access to the Internet also varies. The Republic of Korea has long been the leader in the percentage of households with high-speed access, and indeed overall Asia is the clear leader in broadband.