Chapter 2
ICTs IN EDUCATION IN INDIA AND ABROAD

The present chapter provides an account of the status of ICTs in education abroad, in India and in North-East India and their outcomes. They deal with both the old and the new ICTs such as television, Internet, mobile phone, satellite/dish television and others. The aspects like access to, use of, attitude towards and impact of these ICTs are widely covered in this chapter. Information and Communication Technologies (ICTs), a recent development in technological advances, have accelerated a socio-economic and cultural revolution in society. They have become significant building blocks of the post-modern society within a very short time and are applied in diverse social areas such as agriculture, business, health, geographical information system (GIS) and the like. One of the important social domains of ICT applications is education where the ICTs have altered the way the knowledge is produced, processed, acquired and disseminated. ICTs generally referred to a set of diverse technological tools and resources, used to communicate and to create, disseminate, store and manage information (Blurton 2002), are specifically the computing and communication facilities and features which diversely support the teaching, learning and a range of educational activities in the existing world divided by rural-urban, class and gender differences. The early dichotomous concepts used to denote such social differences are such as race, socio-economic status, gender, educational attainments, geographical divide – rural, urban and central city, age and generational divide. The inequality of the access to information is termed by various names such as ‘digital divide’, ‘knowledge gap’, ‘participation gap in the information society’ and, more recently, ‘computer literacy gap’. The diffusion of innovations theory conceptualizes and classifies the digital divide into four categories; viz., (i) Who is divided? (unit of analysis): Individuals, organizations/communities, societies/countries/world regions; (ii) Which attribute divides? (attributes of nodes and ties): income, education, geography, age, gender, ownership, size, profitability, sector etc.; (iii) How divided? (level of digital sophistication): access, uses, attitude and impact and (iv) What type of ICT divides? (type of technology): mobile phone, Internet, digital TV etc. (Martin 2010). This classification has far-reaching consequences with practical relevance to understand ‘knowledge gap’, i.e., the differentiated access of various social groupings such as gender, income, race and location to information and knowledge. However, ICTs applications have enormous potential for social equalization, as well, in case of their availability to the people with equal opportunity in different social realms where education occupies a crucial position for emergence of an information society, not only in developed world but also in the developing areas like India. But the moot question is: How ICTs are factored into the education existing in a social environment of multiple inequalities? Do ICTs merely add digital divide to the existing social inequalities in education? Or, are they leveling the existing social inequalities of education in India? The chapter is based on the literature available on the access to, uses of, attitude towards and impact of the three ICTs; namely, Internet, mobile phone and satellite television in education in India.
ICTs IN EDUCATION ABROAD

Of the world’s population 80% has never made a phone call. The Internet connects 100 million computers but that is only less than 2% of the world’s population. London has more Internet accounts than all of Africa and New York has more phone connections than all of rural Asia (Kumar 2006: 5). This section deals with the access to, uses of, attitude towards and impact of television, Internet, mobile phone, satellite television and so on in the contemporary world.

1. Use Patterns of Internet in Education

It is the biggest network of the world. It uses a protocol called Transmission Control Protocols/Internet Protocol (TCP/IP) suite to allow computers to communicate. Users can connect to the Internet via direct connections, online information services and Internet service providers. Computers on the Internet use client/server architecture. Its features include e-mail, mailing lists, Telnet, World Wide Web, file transfer, vast information resources, interest group membership, interactive collaboration and so on. Internet is an international network connecting approximately 1,40,000 smaller networks in more than 200 countries (Arulsamy and Sivakumar 2009). The debate about the digital divide argues for the Internet’s ability to bridge the knowledge divide between the developed and the less developed countries by enabling wider access to otherwise scarce educational and informational resources (UN 2000). “As the global economy is gradually transforming to a knowledge economy and with the reality of globalization, the role of ICTs continues to gain more significance”. “.....education, information, science, and technology become the critical source of value creation in the Internet-based economy” (Castells 1996). Currently, the focus of the debate over digital divide is shifting towards the aspects of both accessibility and content as the digital revolution accelerates the rate of globalisation and multiplies its impact exponentially across the world. An estimate of its rapid growth can be had from the fact that while radio took long thirty eight years before 50 million people tuned in, television by comparison took thirteen years to reach the same level and personal computers (PCs) reached this level of use in sixteen years. But the Internet did it in just four years (Kumar 2006: 3).

Studies on the access to Internet in education are widely found. The National Electronics and Computer Technology Center (NECTEC) incepted the SchoolNet Thailand Project in 1995 with the joint effort of the Telephone Organization of Thailand, the Communications Authority of Thailand and the Ministry of Education to expand the universal access to include content development in the Thai language. It built a network infrastructure for education in Thailand that connected 152 local secondary schools to the Internet and commissioned Kasetsart University and the Institute in September 1998 for the promotion of teaching science and technology to create Thai language websites on secondary school-level mathematics, physics, chemistry, biology, engineering, the environment and computer science; it also developed an easy-to-use web authoring application called the Digital Library Tool Kit that allowed teachers to create Web-based lessons in Thai. The major achievement of the project was that there were approximately 4,000 schools in its network with over 900 of these with their own web pages (NECTEC 2002: 6-13).
Based on the interpretive research methodology using the theory of institutionalism and semi-structured interviews by email or telephone a study was conducted on nine academics actively involved in research in the fields of Business Studies (4), Management of Information Systems/Technology (3) and Education (2) were first sought in Saudi Arabia’s main universities and institutions from two private institutions; viz., Dar AlHekma College and Effat College; and four public universities; viz., King Abdulaziz University, King Fahd University, King Saud University and Taybah University of Saudi Arabia’s three main regions; viz., Najd, AlHijaz and AlShargiyah between the months of July and August, 2005 to look at the extent to which access to electronic journals has empowered the Saudi academic community in their research. The findings suggested that although the majority of the academic community agreed that academic research engagement was important, a majority of them engagement in both regular academic research and especially accessing electronic journals via the Internet was limited due to being not directly linked to faculty evaluation and promotion criteria, and overloaded with teaching responsibilities. The tendency to avoid using electronic journals via the Internet for academic research was highlighted by three issues, such as generation gap, limited technical skills and language barriers. They believed that it could not replace traditional means of research which needed the localization of knowledge and resources. Furthermore, their limited engagement with ICTs for academic research was shaped by various contextual constraints of Saudi Arabian educational institutions including the perceived role of such institutions as places of instruction rather than research (Ali 2006).

Using qualitative approach, a study examined the influence of gender role on the usage pattern of Internet of five academicians – three females and two males – from middle-age category of 30-52 years in a private university in Malaysia at home in terms of usage frequency, knowledge and experience on the Internet, purpose of information searching at home and usefulness of e-mails as a communication tool. The study showed that the female participants were junior lecturers having one to three children and the male participants were senior lecturers with one and two children respectively. The experience in Internet usage ranged from nine to fifteen years. It derived five themes related to respondents’ experience and Internet usage pattern as well as about the influence of gender role on the Internet usage pattern, such as understanding of the Internet, experience with Internet, purpose of Internet for information seeking, frequency of Internet usage, e-mail is perceived as a communication tool and the influence of gender role on the Internet usage pattern. The gender role influences Internet usage pattern at home and women were seen to have more limitations compared to men to access to Internet at any time due to family commitment and proper maintenance of household chores (Munusamy and Ismail 2009).

Web-based education is a growing concern in most European countries and there have been efforts on its application into language teaching or complementing the traditional system with virtual learning and teaching. One of the major obstacles on the implementation of such systems into English Language Teaching (ELT) in Greece has been the disinclination of the teachers and instructors to adopt Information and Communication Technologies as an effective tool in language teaching. A study explored the attitudes of 44 English teachers – 4 men and 40 women, (mean age 29 years) in primary education toward the integration of ICT into the web-based ELT. A questionnaire including 40 questions adapted by the University of
Warwick on ELT were sent to English language teachers in Greece. The findings revealed that all teachers had computer at home and had access to computer facilities in 78% of the schools; 91.3% teachers had positive attitudes towards ICT who liked using computers for teaching purposes, felt confident using the Internet and were willing to devote their time online; with focus on language and communication, foreign language teachers were continually searching for better ways of accessing authentic materials and providing experiences that would improve their students’ knowledge and skills and majority of them expressed the pressing need for a teacher-friendly website to supply web-enhanced English language learning resources and activities. Mostly young teachers tend to use ICT applications and resources, such as the Internet, CD-Rom and power point presentation. Meanwhile, search engines, e-mail, chatting software, blogs and online resources appear to be rarely used by EFL teachers (Dogoriti).

Thus, the evidence shows that several interrelated and positive factors have been found to encourage the adoption and development of Electronic Theses and Dissertation (ETD) programs in university libraries in the world including the Arab Gulf States; such as, the appreciation of the benefits of ETD programs, awareness of these programs, and effective promotional and advocacy work that lead to cultural changes related to views on ETD programs. On the other hand, some negative factors have been found to discourage the adoption of ETD programs which include technological factors, legal issues and other administrative issues. The study concludes that most issues influencing the adoption and development of ETD programmes can be resolved by undertaking appropriate promotional and advocacy activities (Salmi 2008: 226-236).

The digital divide is the gap between those with regular; effective accesses to digital technologies, in particular the Internet, and those without. The global digital divide is a term often used to describe the gap between more and less economically developed nations, while at the national level, there is often an urban-rural divide. In developing countries, most Internet users gain access through public access points like Internet cafés. A study has taken a closer look at the digital divide within Tanzania. Based on a survey among 265 Internet café users in five towns of rural, semi-urban and central regions of Tanzania and previous in-depth interviews with business owners as well as with users which prepared the ground for developing a questionnaire in the Kiswahili language, it was found that the divide is mainly a question of finding venues with technology to access the Internet. The survey was executed during two periods in 2004; viz., January/February and September. The Internet users and usage at the different sites are surprisingly uniform, however, with a few significant differences (Furuholt and Kristiansen 2007).

Based on face-to-face semi-structured interviews with 17 respondents, 10 MBA (Masters in Business Administration) students (full and part time) and 7 staff from the university’s computer services and library management, the students’ association and the School of Education, the Media and Learning Technology Services and the Management School, an empirical study of the Wireless Local Area Network (WLAN) technologies, such as Wi-Fi in the University of Edinburgh, Scotland, explored the adoption processes of the new technology by both the university, and students and staff and considered factors behind the decision to offer wireless and response of students and teachers in 2004. It was found that
although the wireless network was available to all MBA students at the Management School, it was used by less than half of them. Students’ ownership of the laptop with Wi-Fi (Wireless Fidelity) ready together with the amount of time spent at the school affect wireless use within the school. E-mail was used between students for educational and socializing purposes, and with teaching and administrative staff for course-related communication. The access to the school’s student portal which acted as the notice board and gateway to MBA-related resources including teaching material, past exam papers and e-mail was also used extensively. Online access to academic journals held by the university, researching course-related material in newspapers and on commercial and government websites were reported as popular uses together with research on post-MBA careers. Students appeared satisfied with the resources available online. The study suggested that both e-learning and m-learning were relatively underdeveloped (Lee 2007: 369-380).

An empirical study was carried out on undergraduate degree course in Information Systems Management consisting of the creation and broadcast of 13 podcasts, distributed over four months in which 90 distance students took part. Information Systems Management was a compulsory subject worth 4.5 (comparable to 45 class hours) taken during the first year of the degree in Industrial Engineering, and taught on a distance basis during the Fall semester. This course was offered by the Universitat Politècnica de Catalunya at the School of Engineering ETSEIAT. The findings suggest issues in distance courses, such as (i) podcasting is a powerful tool as a complement to the traditional resources on a course, but not a substitute for them, (ii) the characteristics of podcasting increase the impression of permanent contact between students and teachers, increasing students’ motivation and (iii) the use of podcasting allows for a diverse range of student skills and learning methods (Fernandez, Simo and Sallan 2009: 385-392).

An empirical study on a sample of Jordanian distance education students into a requirement model addressed the need of such education at the national level by using questionnaire on a sample of 100 students enrolled at two universities offering open distance education. The study showed that distance education was offering a viable and satisfactory alternative to those who could not enroll in regular residential education. It also showed that the shortcomings of the regular and the current form of distance education in Jordan could be overcome by the use of modern information technology (Ahmed 2007: 146-156).

Another study explored into the role of weblogs in supporting pre-service teachers from the Bachelor of Education (B. Ed.) program at the University of Hong Kong and the key factors determining their engagement with weblogs. It was an integrative approach that puts weblogs alongside with other popular media, such as e-mail, Instant Messenger (IM), phone and face-to-face (F2F) meeting, in use. 13 participants were purposefully chosen on class basis by using survey method. It was found that weblogs were perceived as valuable in relieving isolation, documenting their experience and expressing their personal feelings; Instant Messenger and phone were rated as the most frequently used media. The study deepened the insights into the distinct benefit of weblogs as educational media and informs the future development of an online community with weblogs (Deng and Yuen 2007).

A multiple case study design was applied in two distinct Bhutanese communities, the rural community of Tangmachu and the urban Bhutanese community of Thimphu, in 2006, to examine the relationships that exist between gendered access to education and the ways in
which mobile phones, fixed phones and the Internet are perceived and used in these communities. Its purpose is to deepen the understanding of how gender relations, organized education and the appropriation of technology interact with one another. Fifteen, each, semi-structured interviews were conducted in Thimphu and Tangmachu for a total of 30 from respondents of 18 years or older. Besides, 11 key informant interviews (KIIs) were conducted with individuals from NGOs and government offices and private sector representatives. The findings organized by levels of literacy reveal similar patterns in ICT perceptions and use across the two communities. The role of literacy and numeracy were found to be influenced by existing gender norms and the increased opportunities stemming from higher levels of education included broader social networks, enhanced employability and increased mobility (Sinha 2009: 21-34).

A longitudinal study with mandatory use of a course management system WebCT 6 was conducted to understand 145 college student evaluations of WebCT 6 at a major northeast university in the US. Two data sets were collected during the Fall 2006 semester. Participants were asked to rate their current attitude toward WebCT 6 and toward using WebCT 6 and their behavioural intention (BI2) to continue using WebCT 6. Findings showed that attitude toward behaviour was a strong predictor of intention; attitude toward object (ICT) influenced intention indirectly through attitude toward behaviour and intention during initial use had a strong positive effect on intention during continued use. In addition, the roles of previous attitudes on current attitudes were dependent on whether the current attitudes were about initial use or continued use (Zhang 2007).

The advertising industry is a lucrative business in Malaysia. However, government intervention in the industry has to certain extent regulate the content of the advertisement messages. This in turn has impacted the formation of consumers’ attitude towards advertising. As such, it is crucial to identify the determinants of their attitude. The aim of this research is to investigate the determinants of consumers’ attitude towards advertising among tertiary students in a private higher education institution in Malaysia. A total of 263 undergraduate business students from a private university in Malaysia were administered through the questionnaire. The outcome shows that credibility, informative, hedonic/pleasure and good for economy positively relates to consumers’ attitude towards advertising (Ling, Piew and Chai 2010: 114-126).

To ensure the success of online business, it is important for the retailers to understand their targeted customers. This study examines the significance of attitude towards online shopping. The two fold objectives of the study were to determine relationship between attitude towards online shopping with shopping orientations and perceived benefits scales. The second section investigates factors that influence peoples’ attitudes towards online shopping. A five-level Likert scale was used to determine students’ attitudes towards online shopping. A self administered questionnaire, based on prior literature, was developed and a total of 370 post-graduate students were selected by random sampling. The regression analysis demonstrated the determinants of consumers’ attitudes towards online shopping. Additionally, utilitarian orientations, convenience, price, wider selection influenced consumers’ attitudes towards online shopping (Delafrooz et al. 2009: 200-209).

Another study reported the impact of the Internet on the lives of men and women. A content analysis of 200 postings from men and 200 from women on the topic of “Has the
Internet changed your life?” (http://news.bbc.co.uk/1/hi/talking_point/default.stm) invited by the BBC News website on 24th July, 2006 was undertaken to examine the gender differences. Results showed more women’s postings mentioned having made new friends and having met their partner, renewing old friendships, accessing information and advice, studying online and shopping and booking travel online while more men’s postings mentioned that the Internet had helped and given them a career, positive socio-political effects and negative aspects of the technology. The results were interpreted as supporting the view that the Internet represented an extension of broader social roles and interests in the offline world. Gender differences showed that the perceived impact of the Internet broadly reflected the concerns and motivations associated with men’s and women’s gendered social roles (Colley and Maltby 2007: 2005-2013).

The impact of information technology on productivity in the private sector has been extensively researched. But the study of the impact of information technology expenditures in schools has been limited. This study of 1090 California schools and including over 6,000,000 students attempts to address this issue through an analysis of IT expenditures at the school level and the effect on standardized reading and mathematics test scores. Thirteen other factors were also included in this analysis of the 2001-2002 academic years which included public school grades two through eleven. The results indicate that socio-economic status as measured by the percentage of students receiving free or reduced meals was the most significant factor in determining test scores. Also significant was percentage of fully qualified teachers. Information technology as measured by a number of factors did not show significant and positive effects on student performance (Peslak 2004).

Another study on the impact examines and discusses the problems, challenges and benefits of implementing E-Learning in Nigeria by reviewing the consciousness and willingness of the selected Universities and adopting the survey research method and questionnaire for the data collection. The findings of the study show that out of the 18 universities selected from different specialization areas, i.e., three universities from each Geopolitical zone, only 12 responded with usable answers; awareness of e-learning among the universities was very high but investment and commitment to develop an e-learning application was very poor and below expectation; most of the staff and students in the universities only used Internet related e-learning site just for the sake of finding related information for their researches. The study also found out that some of the universities had web page and others were in the trend of creating a web page, which was usually for advertisement of the universities but not for the e-learning activities; staff and the students had also been using e-mail and Internet in addition to developing web pages for transaction of students; the universities were planning to invest number of funds in future in the selected areas of the e-learning application; there were significant differences across both forms of e-learning activities and type of universities in Nigeria (Kamba 2009).

Using both questionnaire and constructive interview the data were collected from two sample groups; viz., students in Sripatum University and IT experts and e-learning teachers to study the effect of organizational culture on the acceptance of e-learning for Thai students in higher education. The study showed that organizational culture can effect on e-learning. Both of the sample groups accepted e-learning in high levels. Using e-learning of the students was
depending on personal characteristics, motivation, interesting and attitude and also depending on the comparing cost of studying between e-learning and in classroom (Chanasuc and Praneetpolgrang 2008).

Another study was conducted at four public institutions in Wuhan and China in 2007 to examine the effect of Internet. Two classes; viz., humanities and social sciences, and science and engineering, were asked to complete a questionnaire during the class hours. Psychometric analysis was performed to assess the internal consistency, convergent and discriminant validity of the Internet knowledge was shown to be a reliable and valid construct, distinguished from Internet experience and Internet self-efficacy beliefs and had a significant effect on the intention to continue to use Internet (Wei and Zhang 2008).

Briefly, Internet is used by the academic community for accessing electronic resources in research and academic activities all over the world. There is a trend among educational institutions of different countries of developing the web pages for advertisement of the institutes. The gender role influences Internet usage pattern among women who have limited time for spending on Internet due to the family rearing and household chores. Besides, distance education or e-learning has offered a viable and alternative arrangement of study for those who could not enroll in regular residential education.

2. Use Patterns of Mobile Phone in Education

Mobile phone came into being when American Telephone and Telegraph Company (AT&T) introduced its first network to approximately two thousand customers in 1977 (Oneupweb 2005). Since then mobile phones have been adopted worldwide at a rapid pace that the penetration rate of cellular phones has outrun that of landline telephones and even exceeds the level for televisions. There were more than three billion mobile subscribers throughout the world which became double by the end of 2011 (Global Information Inc. 2006 and World Cellular Information Service 2008). The growth of subscribers has been rapid in the Asia Pacific region. When first introduced, mobile embraced analog technology which was an expensive service with limited capabilities and infrastructure. With the advent of digital technologies in the early 1990s and their evolution through new generations of technologies, both the capabilities and costs of mobile service have improved dramatically, thereby, hastening its diffusion throughout both developed and developing countries (Rouvinen 2006). Mobile phone has also been recognized for its expected ability to diminish the digital divide. Castells et al. (2007) noted that the key factor in the rapid diffusion of mobile communications was the embrace of this technology by the younger generation.

Mobile Learning (M-learning) has become a significant area of study in education, now-a-days. It benefits those who would like to develop and design m-learning systems or materials through learning by playing, game-based education system design and development. Studies conducted on mobile phone in education show that cell phones are a technological source for youth, age 8 through 18, in the United States and across the world. Young people across the United States and around the world have integrated cell phones and the technology that comes with cell phones into their everyday lives (Alampay 2008: 212; Kaiser 2010).

M-learning is a new tool in the pedagogical arsenal to support students and teachers to navigate the options available in the expanding world of distance learning. M-learning is learning accomplished with the use of small and portable computing devices. These
computing devices include smart phones, personal digital assistants (PDAs) and similar handheld devices. M-learners typically view content and lessons in small and manageable formats that can be utilized when laptop or fixed station computers are unavailable. The first published studies focusing on M-Learning began around 2000. Sharples (2000: 177-193) discussed the potential for new designs in personal mobile technologies in April 2000 issue of “Computers and Education” that could enhance lifelong learning programs and continuing adult educational opportunities.

Donna Abernathy (2001: 20-21) provides one of the first looks at the technology and how it could affect future business approaches with regard to learning initiatives. M-learning options do not necessarily seek to replace the PC as a be-all tool, but instead notes that it will help supplement corporate learning objectives with on-the-go tools. Although Wi-Fi technically existed at the time the Abernathy work, it was not fully developed or nearly as ubiquitous as it is currently. Abernathy accurately noted that the fledgling state of Wi-Fi technology could be a major stumbling block for future advances.

Many studies began to appear between 2002 and 2006 that reported similar findings indicating M-learning technologies were expanding and becoming commonplace in a variety of learning environments.

Seppala and Alamaki (2003: 330-335) investigated the training and instruction of Finnish teachers using mobile technology in the classroom. Their experience and concerns with the new technology focused on several factors. First, they noted that given that 98% of Finland’s university students owned cell phones in 2002, instruction via mobile learning opportunities seemed to be an important next step in the digital learning revolution. In their study of the use of Short Messaging Service text messaging (SMS) and digital pictures, content material was sent to a centralized memory bank. Each user could “withdraw” this material at any time for review and study. The teachers regarded the ability to take notes at any time and the capacity to work on materials during their daily travel time as a second advantageous feature. Feedback on educational content was offered almost instantaneously given the characteristics of the devices being used (cell phones, PDAs etc.), and the researchers felt that this factor allowed them to be more honest in their responses and opinions about the potential of mobile learning. Seppala and Alamaki concluded that M-learning has a multitude of advantages and that this technology has a place in the teaching models of the future.

Attewell (2003: 14) tackled a question many educators and some employers have had about mobile learning, particularly in relation to younger users. Some studies have questioned whether SMS texting could actually be harmful to a student’s grammatical development, e.g., vocabulary acquisition and spelling because text messages tend to be compact and often times riddled with acronyms or purposely incorrect spelling designed for speed-of-input. Attewell agreed that these issues are valid concerns. She also noted how a classroom full of students with mobile devices came together to share content and messages counteracting the assumption that cell phones have an isolationist effect.

Whitsed (2004: 273-275) reviewed the advent of M-learning and mobile computing in the field of medicine. The modern classroom environment for medical students is technologically sophisticated. Nevertheless PDA’s that can access patients’ charts from anywhere in the hospital provide an alternative to having to log on to a networked terminal or
a laptop to recall patient details. Mobile devices allow medical interns and residents to take notes and record audio which can be studied and reviewed at a later date. Whitsed states that 28% of U.S. physicians use mobile computing as part of their daily routine.

The pervasive mobile technology is expanding now-a-days. According to Wagner and Wilson (2005: 40-43), cell phones outnumber landline phones in America and other wireless devices are gaining footholds with the help of workplace and community Wi-Fi networks. They make an important distinction between M-learning and E-learning. They argue that as different devices and new delivery tools provide educators with far more options to reach students, the education community must recognize that the model of “command and control”, typical of conventional education structures, is being replaced with a chance to make learning truly collaborative.

Rushby (2005: 709-710) has explored M-learning from a workplace perspective. He compared the benefits of freedom of location with the traditional E-learning models that many companies have in place. He suggested that M-learning is superior to the older format particularly regarding employees’ ability to track and discover new knowledge in whatever setting best benefits their learning style. The hindrance of this type of educational openness was the limited memory and technology of past wireless devices. The useful additions to mobile devices, such as GPS and video/audio enhancement make the possibilities of the devices themselves much more robust.

Using HotLava WAP software called Learning Mobile Author (LMA), a study was conducted to evaluate the effects of access to review and study material made available on mobile devices—primarily web enabled cell phones. Learning Mobile Author is a mobile learning software program designed by Hot Lava Software Inc. It guides the user through the development and publishing of mobile-device-ready web content. A total of 112 students in a large ‘Introduction to Sociology’ course at a midsized state university in the Northeast in the 2006 spring semester were selected for the study. The study found that students in this class using web-enabled cell phones to assist in their review of test materials outscored the students who used more traditional means (handouts and review lectures) to practice and review materials (Mcconatha, Praul and Lynch 2008: 15-22).

Briefly, many college students have regular access to personal computers delivering notes and study materials and exams through course management systems. It has taken more than a decade for mobile phone technology to reach the level it has. The personal computer may be a technologically more advanced medium, but it is not portable and thus, students are likely to carry around with them on a day-to-day basis.

Briefly, M-learning does not seek to replace the utilization of Internet to aid in learning, but rather to supplement it with interesting new methods that use a preferred medium increasingly available to students at affordable prices and already widely in use.

II
ICTs IN EDUCATION IN INDIA

Many studies were also carried out on ICTs in education in India. In this section, studies conducted on the access to, uses of, attitude towards and impact of television, Internet, mobile phone, satellite television and so on are reviewed as under:
1. Internet Technology Applications of Education in India

Sociologically, the Internet is a network of people using computers that assist the system communication and make available a vast amount of information. Internet brings a fundamental change in perceiving and conducting the teaching and learning process from the teacher-centred to the student-centred education and the traditional to the virtual classroom and it is universally embraced by teachers and students.

Following stratified random sampling on a sample of 100 Bachelor of Science (B.Sc.) Agriculture students of G. B. Pant University of Agriculture and Technology, Pantnagar – 25 students from each year – through self-administered structured questionnaire, another study on the Internet use pattern among undergraduate agriculture students of G.B. Pant University of Agriculture and Technology, Pantnagar, indicated that four fifths of the students had access to Internet, all male and only most of the female students reported cyber cafes as the place of Internet access (Rajput and Ansari 2008: 62-66).

A survey was conducted on the Internet use and access patterns among scientists in research and academic institutes in Kerala in 2005 to address whether the diffusion of ICTs like the Internet changed the practice of science in less developed areas like Kerala by examining its impact on the research careers of scientists by administering the interview schedule to 261 scientists from two organizational types; viz., the governmental and the university sector belonging to two organizational types that are engaged in conducting research in governmental and university sectors fields in Trivandrum by administering the interview schedule. It is based on fieldwork carried out in 2000. The study found that male scientists outnumbered female scientists both in academic and research sectors in 2005; the gender analysis of this study revealed that 35.2% and 92.6% female scientists were having computers in office and home in 2005 in comparison of 31.5% and 51.2% in 2000; the gender gap had increased from 12% to 20% in favour of male scientists; there was a doubling of Internet connected computers in the workplace from 2000 to 2005; there was virtually no differences among social categories like sectoral differences except by gender; and academics were more productive in publications in regional and foreign journals than government research scientists. The study concluded that gender remains a durable source of inequality in Internet adoption and productivity. It shows that the digital divide moves away from simple inequalities in hardware and software access and use, and towards the more complex inequalities of user interaction skills (Palackal and Shrum 2007: 200-222).

A study was carried out by adopting the survey method during the Refresher Course – RC-167 (IT), 2006 at Academic Staff College, Himachal Pradesh University, Shimla, to know the ICT and Internet awareness amongst students by administering a self-designed questionnaire, observation and interview of some of the participants. After the collection of filled up questionnaires from the respondents the data were tabulated using SPSS Software in percentages shown in the graphical format using MS-Excel. Gender-wise analysis showed that 68.29% Internet users were male and 31.70% were female; income group-wise analysis shows that 56.09% came under the income group between Rs. 15,000/- to 20,000/-, followed by 41.46% who were drawing salary between Rs. 20,001/- to 25,000/- whereas 2.43% was drawing above Rs. 25,000/- (Sinha 2008).
The sustainable franchise model is a very widely applied model for the delivery of IT services to rural and poor populations where limited intervention to support infrastructure and coordinate resources is combined with market-based delivery of IT services to the end user. N-Logue, an example of such franchise, has over 1000 locally-owned Internet kiosks in rural villages in India. A study seeks to assess the work of this new sustainable franchise model in practice by analyzing data from 74 of n-Logue’s kiosks. It was found that gender and education did not affect success, while location and other measures of social standing such as age and caste do; and uses that villagers have for IT services were not different from those of the first world users. It was concluded that local customs and practices, such as the caste system, would not mitigate the social biases against women by good program design (Kuriyan and Bussell 2007: 133-150).

Rajasekar and Sini (2005: 93-95) conducted a study on the Internet knowledge of the research scholars of Kerala University by using the normative survey method and cluster sampling technique and an Internet knowledge test consisting of 30 multiple choice questions on 200 research scholars belonging to Arts and Science subjects in Kerala University on the basis of their residence, gender and faculty. It was found that the Internet knowledge of entire sample was relatively high; the male research scholars had relatively high Internet knowledge than female research scholars; the Internet knowledge of research scholars belonging to the Arts subjects was relatively low while it was high among science subjects and, finally, in case of residence, there was no significant difference between rural and urban research scholars of various subjects in respect of their Internet knowledge.

A study on the Internet use pattern was carried out to find out the accessibility, extent and purpose of Internet use in a stratified random sample of 100 Bachelors of Science (Agriculture) students of G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand – 25 students from each year. It revealed that 81% students comprising both male and female students had access to Internet, all male and 75% female students reported cyber cafes as the place of Internet access, followed by the university library and hostel; 26% of both male and female students spent 2-3 hours daily and 33% of both male and female students used Internet for e-mail, assignments, project proposals, chatting on Internet, etc. It was concluded that the picture of ICT infrastructure and its use was not satisfactory due to the lack of proper ICT infrastructure, poor perceptions of potential of ICT among the academic staff and lack of motivation of teachers which needed to be given priority to realize the true potential demand for educational services of ICTs (Rajput and Ansari 2008: 62-66).

The Internet has been used in the open and distance education (ODL) which was originated from the need to extend learning opportunities at various levels to people who could not access traditional institutions for reasons borne out of economic, familial, spatial, temporal or geographical restrictions. The findings of a study of the e-learning technology implementation in universities in Thailand suggested that the students were used to instructions in the structured format using traditional norms of education. The key issue for the university has been to persuade students and instructors to use ICTs effectively and also to motivate themselves to integrate the learning and teaching procedures.
Another study on the Virtual University Trial Project (VUTP) which covered 65 universities and five companies and launched by the Government of South Korea in 1998 was designed to create a cost-effective virtual education system without diminishing quality. Participating institutions experimented with various technologies like satellite broadcasting, videoconferencing, video-on-demand, intranets and the Internet. But two years after the VUTP, it was found that policymakers and educators in South Korea continue to grapple with issues of quality management, capacity building, cost-savings, open access and the appropriateness of the instructional model for adult learners.

The study conducted to know challenges faced by the African Virtual University (AVU) learning centres in Ghana and the strategies being employed to ensure their survival revealed that after ten years in operation, the learning centres in Ghana are confronted with some prominent challenges, such as accreditation as a result of the termination of the AVU and the Royal Melbourne Institute of Technology (RMIT) partnership, inability of students to complete payment of fees, students dropping out, neglect and irregularity of electricity supply. The coping strategies being used are arrangements with RMIT, withholding the certificates of defaulting students and recording and downloading presentations.

The new learning and telecommunication technologies and their potential applications enriched the learning process and to ensure educational equality for all students. The early development and the accelerated growth of the Internet lead to the most commonly used Internet tools, including the Web browser. The World Wide Satellites, the educational satellite consortia and potential and innovative uses of satellite communications for learning and education have the potential of distance education. Finally, it attempts to show the significance of developing effective cooperative groups for educational technology (Rajasekar and Sini 2005: 93-95; Rajput and Ansari 2008: 62-66; Kandall and Singh 2007; Siritongthaworn et. al. 2006; Jung 2002; Ayeh 2008: 266-273).

In spite of various advantages e-Learning has over the conventional approach, the diffusion of eLearning is rather slow. One of the reasons for this is the lack of information and negative perception among students. Business and Engineering Education in India is booming since last couple of decades. In spite of large number of B Schools/Engineering Colleges are offering graduate and Post Graduate programs, there still exists demand – Supply Gap. The second area of concern is the quality of output. Application of Information and Communication technology (ICT) or eLearning is the only solution to address the twin concerns – Quantity and Quality.

An empirical research study was carried out with objectives to ascertain the perceptions of MBA and B. E./B. Tech. students towards e-Learning; to ascertain their perceptions towards prevailing learning environment; to ascertain the computer and Internet skills level amongst MBA and B. E./B. Tech. students and to ascertain the relationships between above three. The data collected were analyzed using Descriptive Statistics, Mean Ranks, ANOVA and t tests. The findings were useful while promoting eLearning/Distance Education Technologies in developing countries. Though the study was focused on
Business/Engineering Education, the findings can be generalized for Higher Education in neighboring developing countries as well.

Another study contributes to the understanding of the effectiveness of online discussion forum in student learning. A conceptual model based on theory of online learning and media richness theory was proposed and empirically tested. The current understanding of media richness theory was extended to suggest that use of multiple media can enrich the communication context and perceived learning. Hierarchical regression was applied to investigate the relationships between antecedent factors, interaction and perceived learning. The results show that the perceived richness of online discussion forum has significant positive effect on student participation and interaction, and learning, when used along with traditional classroom lecture. Implications of these findings provide important guidelines for management educators (Dhume, Kamble and Gondkar 2007; Balaji and Chakrabarti 2010).

The study on the Internet use and access patterns among scientists in research and academic institutes in Kerala in 2005 also found that 3.11% of academic scientists spent more hours each week using computers in 2005 whereas it was 1.23% among university scientists in Kerala; only 92.6% respondents reported ready access to e-mail, a 6% increase since 2000; there was a general increase in the diversity of uses of the e-mail and the World Wide Web and academics were more productive in publications in regional and foreign journals than government research scientists in 2005. The study concluded that gender remains a durable source of inequality in Internet adoption and productivity (Palackal and Shrum 2007: 200-222).

A study is available of 90 personal interviews with professional scientists working in four Indian institutes, both, government and university sectors; namely, the Central Tuber Crops Research Institute (CTCRI), the Centre for Earth Science Studies (CESS), science departments at the University of Kerala (U.K) and Kerala Agricultural University (KAU) in Thiruvananthapuram between 2003 and 2004. It addressed the relationship between ICT and social change under the structural conditions of patrifocality characteristic of the Indian subcontinent in order to show the manner in which ICTs were beginning to reduce the influence of patrifocality on the careers of female scientists in Kerala. The study found a disparity in terms of degree of connectivity, i.e., governmental research centres had an advantage over academic institutions; female scientists were constrained from acquiring higher degrees from universities outside of Kerala and most of them completed their doctoral studies within the State; they remained disadvantaged to travel abroad for conferences, training and research and the Internet was responsible for the cultivation of international ties among many female scientists. It concluded that although the patrifocal social structure remained firmly intact, Indian women scientists had taken advantage of professional opportunities available through the Internet to circumvent its limitations (Anderson 2007: 173-199).

Another study based on the interviews of 329 scientists employed in national research institutes and universities in Kerala over two phases explored changes brought about by the Internet in female researchers’ careers on four dimensions; namely (a) travel experiences, (b)
access to ICTs, i.e., Internet and e-mail, (c) foreign and domestic contacts and (d) productivity in foreign and domestic journals and addressed broader issues of globalization in Kerala between 1994 and 2000. The study revealed that access to ICTs increased but the impact of these resources on women’s careers was uneven; over time and compared to men they were more locally oriented, reported fewer foreign ties and their publication in foreign journals had decreased; but they reported stable domestic contacts and increased publications in national journals. It was concluded that Internet diffusion to Kerala appeared to be associated with increased activity in the local scientific arena but not resulting into greater integration with global science (Miller 2007: 151-172).

The study on the ICT and Internet awareness amongst the participants of the Refresher Course – RC-167 (IT), 2006 at Academic Staff College, Himachal Pradesh University, Shimla also found that in case of designation, maximum numbers of respondents are Senior Lecturers (65.85%), followed by Lecturers (24.39%) and library professionals (9.75%); 75.60% participants using computers said that they were comfortable in using computers for their day to day work whereas 24.39% participants were not using computers; 90.24% teachers were using IT in their classroom activities; 63.41% teachers were comfortable in using MS-Office frequently for their class work; 29.26% respondents had rated their colleges/university for good IT infrastructure; 73.17% respondents said that they were having PC at their home; 46.31% had taken formal IT Training like Diploma in Computer Science, MCA degree, certificate course; in case of Internet awareness, out of 41 participants only 36.59% were Internet literate; 40% were expert; in case of the rating of Internet/e-mail services, e-mail ranks first, followed by WWW, e-journals access, INFLIBNET Databases Search and Chatting; Yahoo (33.33%) emerged as the most preferred e-mail service; 53.33% respondents preferred www.google.com search engine (Sinha 2008).

By opting ex-post facto research design a study assesses the ICT usage for agricultural knowledge dissemination by random sample of 55 professionals working in 30 NGOs in Andhra Pradesh selected from www.apard.gov.in data base. The study found that majority of the NGO professionals belonged to middle aged group followed by young and old age. Women were given equal importance in recruitment to gender equity by NGOs. Of them, 47.28% were post-graduates, 38.18% were graduates and rest of them had education up to doctoral level. Among the communication facilities, mobile phone usage was found by 80% of them, followed by telephone, computer, printer, Internet and public address system. ICTs use in agriculture revealed that ICTs save time of majority of them and reduce the cost while they are useful in reaching the clientele quickly for making presentations more effective. The study concluded that ICTs are useful for NGO professionals in monitoring staff and day-to-day activities, interactions with farmers, creating awareness and information storage and future use, employee training, professional growth, relevant and timely communication (Shekar and Shenoy 2011: 34-39).

A study was conducted on 50 households of Mahabubnagar district of Andhra Pradesh selected purposively through the structured questionnaire to know the critical role played by ICTs and computer education in empowering of the rural women. The findings demonstrated that a large majority of the rural women were from the two age groups: 19-25 years (40%) and 26-30 years (36%), they were post graduates (36%) and graduates level
(44%), 52% of them belonged to OBC category, the family occupation of 30% of them was agriculture and 24% were having business and the income level of family of 44% of them was Rs. 50000/- to Rs. 100000/-. The role of ICTs in empowering them is that 30% of the rural women got the employment in various schools to teach the basic computer skills, 26% of them were creating employment themselves, 16% of them were working as data entry operators while 12% were doing business. The rest (16%) of the rural women were utilizing their knowledge to higher education (Yellaiah and Sushila 2013: 69-71).

Another questionnaire-based survey was conducted on 458 stakeholders – 57 teachers and 401 students – from management streams, such as human resource, marketing, finance, biotechnology, systems and operations from 5 colleges or management institutes of Navi Mumbai to determine the critical factors that impact the effective use of ICT in management education and to identify the expectations and gaps in its use in management education. Findings revealed that both teachers and students gave significantly importance to pedagogical factors relevant for the effective use of ICT like technology being a part of daily routine, keeping up with current developments in ICT, adaptability of the course to being taught through ICT, availability of educational software, time required to learn the use of technology, ease of navigation of the course content through the ICT device and technological factors, such as reliability of ICT, ease of availability of ICT, IT and data security; there was a significant gap between the stakeholders’ expectations and the actual satisfaction with the current usage of ICT and factors that appeared as barriers towards ICT usage were all courses at the institute having course website, availability of the National government policy to implement ICT in the institute, providing library reserves electronically, policy to evaluate the effectiveness of the ICT use, time to upload and download (speed), mandatory technology courses for students/ teachers, technical support to use ICT at the institutional level, better collaboration among teachers using online discussion boards, availability of resources to promote ICT usage, financial readiness of the institute to support ICT and improvement in understanding of complex concepts. The study could be useful to management institutions which are thinking of making effective use of ICT in its curriculum (Goyal, Purohit and Bhagat 2010: 38-57).

By considering four dimensions of empowerment; viz., psychological, social, educational and economic, a gender-based comparative study was conducted by Khan and Ghadially (2010: 659-673) on 155 young Muslim women and men studying in three computer training centres in Mumbai to assess benefits of computer education and uses of computer and Internet technology. The study found that figures for computer ownership and home Internet connection were low for the entire sample and the training centres and cyber cafes were important points of access for females and males respectively. In terms of perceived empowerment, young women reported higher gains than men from computer learning when combined with ICT use. It was concluded that despite the existence of a gender-based digital divide, ICTs showed potential as an equalizing force between the genders. The findings suggest for policy measures to widen access of ICTs and to provide subsidized training.

In brief, the studies indicate that the existing inequalities do play their role in creating digital divide in Internet uses of education in India and their effect is perceptible in various
components of education related to learning and teaching. However, the implicit message is also clear that Internet technology generates equalizing effects if the opportunity of access to it is equally available to the people of different social backgrounds.

2. **Mobile Telephone Applications of Education in India**

The adoption of mobile phones has grown with an average annual growth of 80 percent after their arrival in India in 1995. They have become a significant presence in the social, cultural and economic lives of the people at all levels of the Indian society. The younger generation has embraced mobile phones enthusiastically but changes in social norms have caused anxieties among some sections of the population. Some studies have focused on the uses of mobile phone in different spheres including education. Mobile phones offer a variety of media options for the people under 18 such as music, games, Internet, television, camera, camera recording abilities, social networking and individuality which are used to suit the individuality of the users, especially children and teens. The combined use of mobile phone-based cash systems and social networking websites has enabled small entrepreneurs to venture into e-commerce and helped evolve small informal markets in the information age. Mobile telephony along with telecommunications has enormous potential for augmenting the educational development through m-Learning, i.e., learning facilitated through the convergence of mobile technology and wireless technologies.

In a study conducted on the pattern of mobile uses among undergraduate agriculture students Rajput and Ansari (2008: 42-49) found that majority of male and female students in urban settings owned mobile phone and kept it for their genuine need for constant contacts with parents and other family members, being in touch with friends, seeking emotional support from parents/family members, etc. Of these, 60% students used BSNL for telephone and sending Short Messaging Service (SMS)/Multimedia Service (MMS) and in-built camera. The level of family income is not a factor for accessing and using mobile phones by the students because of the decreasing cost of mobile phones. The study concluded that the youth hooked-up on the mobile is the driving force of the emerging mobile telephone industry.

A comparative study by Chakraborty (2006) among the Indian and the American university students discovered that the Indian students relied on their mobiles more frequently as their only phones and thus developed a relationship with the phones different from their American counterparts. They also differed significantly in the practice of text messaging.

In a study conducted on how the mobile phone use is embedded in the daily life of the youth of Andhra University who were exposed to the impact of globalization Sanjeevayya and Kumar (2009: 257-263) used semi-structured questionnaire and observations for collecting data from 103 students and research scholars from the professional courses of departments of Social Work and Journalism and Mass Communication. Of the sample, 86.4% students and scholars were from 20-25 years age group who were mostly post-graduates; largest number of them (39%) belonged to below Rs. 6,000/- monthly income group; 73.9% of them were from rural background and 24.2% were from urban background and 70.9%
were males and 29.1% were females. These youth, mostly males, expressed that besides using mobile phone as symbol of self-expression, it could be used for inculcating awareness and mutual cooperation and that they were forming an identity which helped them to develop belongingness with global culture.

Another study between the age of 6 and 11 shows that there has been up to an 80% increase in cell phone users. Most children report that they use the phones to contact parents. The girls are more likely to use the phones for social uses while the boys are more likely to play games or access the internet with their phones. Cell phone saturation for teens is almost 100% in some countries. Cell phones also outnumber PC, ten to one. At present, cell phone prices are dropping and most teens have access to cell phone technology (Rajput and Ansari 2008: 42-49; Prensky 2004).

Briefly the mobile phones have become a popular commodity among the students and youth, mostly for self-expression and their use in education is also on the rise. Thus, as a result of their decreasing costs, the mobile phones are fast emerging to bridge the social divides at least in education. However, the regional variations are still persisting.

3. Satellite TV Applications of Education in India

In India, as a result of the historical evolution of satellite communication, there have been possible the various applications of satellite communication and the growth of business communications using the Very Small Aperture Terminal (VSAT). The educational television (ETV) was started in 1960 and the epoch-making Satellite Instructional Television Experiment (SITE) was implemented during 1975-76. In 1961 the first syllabus-based television programme was produced and telecast in India for higher secondary school students of Delhi, popularly known as Delhi School Television project. In this project, programmes were produced for Science and English to improve their understanding and knowledge of these subjects. Paul Neurath, an American Sociologist, who evaluated the impact of Delhi School Television on invitation from Ford Foundation, concluded that students from science subjects in the age group of 13-15 years in Delhi who watched school television programmes benefited from it. Though a number of similar experiments in various parts of India have been conducted, no regular evaluation reports are available to understand its impact. Hence, it is difficult to say under what circumstances educational television could be most beneficial to the higher secondary students (Neurath 1968).

A satellite is an object that revolves around a planet. In India, the space programme was formally launched in 1972 with the setting up of the Space Commission and the Department of Space. The first Indian Satellite, Aryabhatta, was launched in 1975. The various applications of satellite communication and growing trends of business communications using the Very Small Aperture Terminal (VSAT) are possible as a result of the evolution and history of satellite communication. Training programmes conducted in nine districts of Gujarat to transfer professional knowledge to the grassroots level aimed at increasing competencies of its members to function with alternative models. The Self-
Employed Women’s Association (SEWA) used the satellite talkback communication system under the Training and Development Communication Channel (TDCC). The network consisted of the three major elements; viz., the teaching, the receiving end and the spacecraft. The experience of these programmes indicated that they were effective in reaching a large number of SEWA groups in rural communities within a limited period of time and an average of 150 questions were shared on some common issues like appointment of women talati (Secretary of the village Panchayat), absence of electric supply etc. (Nanavaty 2000: 163-167).

The educational television (ETV) was started in 1960. The Satellite Instructional Television Experiment (SITE) was epoch-making and was implemented during 1975-76. The University Grants Commission (UGC) telecast educational television programmes on Doordarshan’s National Network via INSAT System through the Country-wide Classroom (CWCR) TV programmes, sponsored by the UGC from 15.08.1984. Studies on the programmes reveal that the programmes were very useful in both rural and urban areas of India as knowledge received more emphasis in all of the programmes, however, due importance was not given to understanding and application; over two thirds of the programmes were adequate in content; the formats of near about half of the programmes were lecture, discussion and interview; the visuals of the programmes were quite clear and attractive but transmission disturbances were also observed and the voice of the programmes was distinct and normal through the language media of English (Mohanty and Mohanty 1996: 220-227).

Another study was conducted on the critical appraisal of UGC TV programmes in 1992-93 to analyze the countrywide classroom ETV programmes in terms of contents, presentation and effectiveness of CWCR ETV programmes in terms of students’ achievement. A sample of 25 countrywide classrooms ETV programmes was telecast from 21st September 1992 to 11th December 1992 which was recorded and all the humanities B.Ed. students (1992-93) of Dr. Parsuram Mishra Institute of Advanced Study in Education, Sambalpur, constituted the sample for the study. Major findings of the study suggested that, except knowledge, none of the other objectives; namely, understanding application, skill, attitude and interest was given due weightage; content was adequate in 60% of the programmes; the programmes had equal effect on learning of both male and female students; the programme ‘Cyclone Resistant Rural Houses’ and ‘Packaging Industry II’ had higher positive effect on learning of female students as compared to male students and, similarly, the programme ‘External Borrowings III : Economic Restructuring and Borrowings in English to the French Connection’ had higher positive effect on learning of male students as compared to female students (Sahu 1998: 57-63).

In the critical appraisal of UGC TV programmes in 1992-93 analyzing the contents, presentation and effectiveness of the Countrywide Classroom (CWCR) ETV programmes for the MBA students in an urban setting, it is found that, except knowledge, due weightage had not been given to understanding application, skill, attitude and interest; content was adequate in over a half of the programmes and all the ten programmes had positive effect on both the male and female students’ learning (Mullick 1998: 64-73).
Another tracer study conducted by IGNOU on the utility of MBA programme as perceived by students who had successfully completed the MBA programme during 1992-94 found that half of the students perceived the MBA programme as most useful for knowledge enrichment; the problems identified by the students were classified under three categories; viz., problems related to recognition of degree in their own organization, by any other organization/institute/university, interpretation of grades, etc. The students gave useful suggestions of increasing knowledge and skills, making the programme more acceptable by employers organizations, placement services which may be provided by the university, etc. (Aggarwal 2004; Calla and Shankar 1997).

Briefly, like mobile phone the satellite TV has more equalizing effect on the populations, however, gender differences are perceived in terms of attractions towards themes of programmes, perhaps, due to need-based differences.

In sum, Internet, mobile phone and satellite television have touched the nook and corner of the Indian society. They have necessitated the needs of the young generation. Though these technologies have reduced the gender, regional and class differentiation in India and opened the path for emerging opportunities in education, there found to persist the division of population in terms of possession of information.

III
ICTS IN EDUCATION IN NORTH EAST INDIA

1. Use Patterns of Internet in Education

The study titled “Scenario of Internet Use Pattern of the University Community and Local Population of Barak Valley” had been carried out on 200 Internet users during the last part of June 1999 to July 2000 with an objective to know how far the university community as aware of the usage of new communication tool, i.e., the Internet and its application in the day to day life of academicians of this region. The survey method was applied by employing questionnaire, interview and observation were employed mainly on faculty members, senior administrative executives, library and information professionals, research scholars and students of Assam University, Regional Engineering College, Medical College and few users from business organizations. The important findings of the study were that majority accessed Internet from the office and cyber café, followed by based in academic institutions and at home; BSNL was the major Internet Service Provider in Barak Valley of South Assam while few subscribers were also connected through NICNET/ERNET and maximum of users surf Internet during night and late night hours (Sinha 2004). The study also found that comparatively female Internet users were less in number. The ratio of male and female Internet users is 70:30; 70% participants belonged to university faculty or community/government service followed by student community (12.5%), businessmen (10%) and minimum who were in private service (7.5%); thus it was concluded that Internet usage was popular among elite group with high income; 32.5% participants were in income group between Rs. 10,001/- to 15,000/-, followed by Rs. 20,000/- and above (Sinha 2004).

In North East India, the Internet and the World Wide Web emerged in the region lately. A study was conducted on the awareness about and use of Internet search engines amongst social science researchers in two universities of Northeast India; viz., Gauhati
University, Guwahati, and North Eastern Hill University, Shillong. Out of 55 researchers, 20 researchers gave their responses which showed that they have similar issues regarding Internet search engines as compared to their counterparts in different parts of the world and suggested that better presentation of websites would help them get indexed by search engines and make them more accessible (Laloo and Lahkar 2006).

The Rajiv Gandhi Computer Literacy Programme (RGCLP), an innovative effort of Government of Assam in introducing computer literacy and computer aided learning in schools, was launched in 2003. RGCLP is aimed to disseminate education among rural children effectively and economically. The gap between people and ICT and education which exists due to the lack of infrastructure facilities is being bridged. Schools in the most rural and remote area have been turn into an information-hub under this project. Educomp Solutions Ltd. has been entrusted by the Government of Assam to implement the programme on Build, Own, Operate and Transfer (BOOT) basis in 100 High Schools under Phase-IV across 10 districts in the state (http://www.digitallearning.in/articles/article-details.asp?articleid=1801&typ=CORPORATE%20DIARY).

Briefly, North-East India is one of the most ethnically and linguistically diverse regions in India. However, it has remained backward in the field of communications after sixty years of Independence. While various development schemes and tools have been devised over the years, the emergence of ICT as a tool of development across different parts of the world opens up new possibilities.

2. Use Patterns of Mobile Phone in Education

In North-East India show the students are seen more inclined to use mobile in education. A survey of 501 Indians, conducted by Nokia in November 2010, reveals that 29% of people from the North-East use mobile phones to download educational applications, mostly searching materials through the Wireless Internet Protocol (WAP). Approximately 25% of people download all applications and focused on applications like games, music and social networking on their smart phone in the North-East. It is observed that there is a regional difference in accessing and using mobile phones.

Briefly, the studies indicate that there is the potential use of ICTs in educational setting, especially in the higher education. It has an enormous potential for the student community who use ICTs for learning different subjects of study.

IV
SUMMING UP

Now, major points of the entire discussion may be re-capitulated here. These are as follows:

(i) Lower income levels lead to the digital divide in accessing to and using of the Internet in education among social classes in rural and inner-city areas; male students have more access to the Internet than female students in cyber cafes, using for net surfing for searching and downloading study materials, sending e-mails, etc. Obviously, this is because of the prevailing social environment which restricts outdoor female mobility, considering their security in the society.
(ii) The majority of male and female students of urban areas have mobile phones, used for telephone, sending Short Messaging Service, m-Learning, etc.

(iii) Educational programmes telecast by satellite television channels for enriching the knowledge have been generally free from digital divide and equalizing across the various social differences. However, gender-based differences based on needs-variations are reflected in the impact of the satellite TV programmes.

(iv) ICTs are equalizing and empowering rural female students also. In a way, ICTs serve as tools making the learning process in higher education more effective than traditional methods.

The potential use of ICTs in educational setting can enhance the educational attainments of students from regional, gender and class background. Technologies are also creating a kind of digital divide among those who have the information access and those who do not. This digital divide is factored into the regional, gender and income level differences of families of students. But, at the same time, these technologies are found to equalize the social differences among people, particularly, teachers and students because the access, uses and impact of ICTs are mostly prevalent among them. Digital divide is more perceived in respect of Internet rather than mobile and satellite TV applications in education. It means that affordability and ICT infrastructure both constrain the access to Internet and its applications in education whereas mobile phone and satellite both have come to the level of affordability and availability of digital infrastructure in the heterogeneous population of India. On the whole, one can say that although the applications of ICTs in education do show the digital divide impact, yet, the divide is perceived to be bridging along the availability of digital infrastructure as experienced in the case of mobile phone and satellite TV.