Chapter: 2

Higher Education & ICT Adoption
It was important to know the current status of ICT adoption by Indian Higher Education before any new adoption model was drawn. This chapter talks about the current status of Higher Education as well as how ICT adoption has been executed at various levels. It also sheds some light on development with respect to MHRD’s various initiatives including NMEICT. It was also important to know the perception and usage of ICT besides trends in spending on ICT in higher education before we met the educators for the study. Hence this chapter builds a premise for our study.

There are 14.6 million students undergoing Higher Education in India as of 2011\(^7\). There has been a significant rise in enrolment from rural population in Higher Education. The GERs in rural areas have been rising steadily and expected to reach 12.84 % by 2020.

The UGC report on Higher Education in India 2008 – 11th Five Year Plan Vol. II, mentions a growing number of women who are expected to enroll in Higher Education Institutes. Currently, over 6.1 million women are enrolled in Higher Education and is expected to grow to 12.15 million by 2020.

Spends in Higher Education (2011 figures)
The 2011 Ernst and Young - FICCI report states that according to current estimates, spends on Higher Education in India will be nearly INR 46,200 crores\(^8\).

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\(^7\) UGC Annual Report 2011
\(^8\) Report on Private sector participation in Indian Higher Education, FICCI and Ernst & Young Higher Education Report 2011
Private institutions account for majority of the spend

- Public Institutions (8%)
- Private Institutions (92%)

Majority spends in public are for general courses while spends in private institutions are for professional courses.

\[ \text{G-I – GER Increase in India}^9 \]

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^9 Ernst & Young Report on Indian Education Sector
G-II – GER Comparison with other countries

10 Ernst & Young Report on Indian Education Sector
MHRD’s NMEICT suggests following figures as part of its Vision Document\(^{11}\) –

Literacy rates: The overall **literacy rate** in the country, as per the 2001 census, was 64.8 %. This implies that we do not even have the formal means to know about the talents of the remaining 35.2 % of the population, **let alone try to nurture their talents**. This is a very high under utilization of the nation’s human resources.

Growth of educational institutions: Between 2000-01 and 2003-04, the number of Colleges for general education has risen from 7900 to 9400 i.e., a simple rate growth of 6.33 % p.a. In the last decade till about 2011 the number of colleges has seen a growth of 11%. The table below provides number of institutions in India (Source : Ernst and Young ad FICCI report 2011).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Univ</th>
<th>No. of Colleges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>27</td>
<td>578</td>
</tr>
<tr>
<td>1960-61</td>
<td>45</td>
<td>1819</td>
</tr>
<tr>
<td>1970-71</td>
<td>82</td>
<td>3277</td>
</tr>
<tr>
<td>1980-81</td>
<td>110</td>
<td>6963</td>
</tr>
<tr>
<td>1990-91</td>
<td>184</td>
<td>5748</td>
</tr>
<tr>
<td>2000-01</td>
<td>272</td>
<td>11146</td>
</tr>
<tr>
<td>2009-10</td>
<td>525</td>
<td>25951</td>
</tr>
<tr>
<td>2010-11</td>
<td>556</td>
<td>31324</td>
</tr>
</tbody>
</table>

\(^{T-0}\): *University types and numbers as of 2011 in India*

The current rate of growth in the number of educational institutions, may not be able to make a dent on the **base line** educational status of the population. Hence, the conventional approach must also be aided and supported by the **technological interventions** through **ICT** so as to make available the knowledge resources to every learner as per his / her convenience and just in time.

\(^{11}\) NMEICT Vision Document (2007)
The growth of any country rests on development of Higher education sector and the past linkages have shown the vital role played by this sector to support and lead economic growth. The quality and scale of the Higher education system are indicators of a progressive economy. India decided to align with British education system in general, post independence. After more than 65 year of independence, country faces many challenges in higher education system. Access, Quality, Research, Infrastructure, Equity – are some of the major challenges it has in front. Findings of some reports suggest that the higher education, given its expansion, may have deteriorated in terms of providing world class quality education. The Government of India has taken several initiatives during the Five Year Plan periods to effect state specific strategies, enhance the relevance of higher education through Curriculum reforms, Vocational programs, Networking, Information Technology adoption and Distance Education along with reforms in governance. However in terms of Gross Enrolment Ratio (GER), India still lags behind the worldwide average and emerging countries like Brazil and China. Despite the progress made in higher education, the Gross Enrolment ratio is low as compared to other countries (XIIth five year plan of Planning commission)

![GER in % in 2007](image)

**G-II: GER Comparison with other countries**
India has one of the largest Higher Education System in the world in terms of the number of institutions. It is only after China and USA in terms of student enrolment. Though this fact speaks about the reach of the system in our country, emphasis is now on its quality as many institutions have to focus on the education that it imparts to its students. The XIIth five year plan has emphasized on the development of benchmarks and key performance indicators to assess the outcome of higher educational institutions. A multi dimensional approach to quality building among the higher education institutes is a must in India.

2.1 Scenario of Higher Education

Among many countries in the world, the Higher education system in India is one of the most developed. The system of Higher Education in India has evolved over the period of years in distinct and divergent streams with each stream monitored by an apex body, indirectly controlled by the Ministry of Human Resource Development. The state Universities are funded by the respective state governments and the Central Universities and Institutes of National Importance are funded through Central Government funds.

All India Council for Technical Education (AICTE) monitors and regulates higher technical education such as Management education and engineering, while medical education is regulated and monitored by the Medical Council of India (MCI). Agriculture education is regulated and monitored by Indian Council for Agriculture Research. The National Council for Teacher Education (NCTE) monitors the entire teacher training institutions in India. The Ministry of Human Resource Development, Government of India also directly controls and funds some engineering, management and medical education institutions.
The higher education system is categorized as follows:

a) Universities: These are established by an Act of Parliament or State Legislature and are of unitary or affiliating type. There are Central Universities and State Universities respectively.

b) Deemed to be Universities: These institutions are given deemed to be university status by the Central Government on the recommendation of the UGC in terms of Section 3 of the UGC Act. Some of these institutions offer advanced level courses in a particular field or specialization while others award general degrees.

c) Private Universities: These are established by various State Governments through their own legislation.

d) Institutes of National Importance: These Institutes are declared as such by the Government of India by an Act of Parliament and are empowered to award degrees. In some cases, such Institutes are also set up by the Government through an Act of State Legislation.

e) Premier Institutes of Management: These are the Institutes that have been set up by the Central Government and are outside the formal university system. They offer Post-Graduate Diploma Programmes, which are equivalent to Master’s Degree Programmes in the area of Management.

The Universities are of various kinds and may either be set up focusing on some disciplinary / faculty areas:

- Universities with single faculty or multi-faculties
- Universities involved in only academic Teaching
- Universities that are affiliating
- Teaching-cum-affiliating universities
- Universities with single campus or multi-campus
- Language Universities
- Technological Universities
- Agricultural Universities
- Medical Universities
- Women’s Universities
- Special Institutes of Medicine, Science, Law, Engineering and Technology, Management and Social Sciences etc.,

*The University Grants Commission* is the main governing body at the tertiary level. It regulates higher education system in India through enforcement of standards and norms required by all Universities and higher educational institutions. It advises the Government of India, and coordinates between the governments at the center and the state regarding education matters.

A breakup of the various types of Universities and other important institutions is provided in the following table:

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Universities</td>
<td>42</td>
</tr>
<tr>
<td>Deemed Universities</td>
<td>130</td>
</tr>
<tr>
<td>Institutes of National Importance</td>
<td>33</td>
</tr>
<tr>
<td>Institutions established under State Legislations</td>
<td>5</td>
</tr>
<tr>
<td>State Private Universities</td>
<td>73</td>
</tr>
<tr>
<td>Private Universities</td>
<td>90</td>
</tr>
<tr>
<td>State Universities</td>
<td>275</td>
</tr>
<tr>
<td>Autonomous Colleges and Affiliated Colleges</td>
<td>31,000 (approx.)</td>
</tr>
</tbody>
</table>

*T-I: University types and numbers as of 2011 in India*
2.2 Technology in Education

UNESCO’s Meta Survey\textsuperscript{12} on use of Technologies in Education in India states that “It is necessary to know what works and what does not, and what the implications are for policymaking, planning and implementation. A second step would be to inform the capacity-building and training provided to staff in Indian institutions. Specifically, it needs to be understood that any new technology comes not merely with hardware and software, but with a learning and teaching style and grammar of its own, and that management practices need to be adapted in order to use the technologies effectively.”

2.3 ICT in Education Sector

It was in early 1980s that computers made their appearance in Universities and School which was featured initially in the advanced countries. It was only after 1990s that internet and broadband connections were available to the Universities and schools form the advanced countries. The experience in developing countries was rather more limited. Initially, teaching computer literacy was the only method to bring about ICT awareness in the classroom. The scenario has now changed as the benefits of ICT are utilized by higher education system at large in terms of low-cost learning and with focus on quality than typical teaching methodology. Currently higher education in India is witnessing transformations in terms of quality, access and equity, which is highly influenced by the diffusion of ICT in the higher education system. The sector in India has seen tremendous change which is due to infusion of ICT in the teaching learning process.

The use of ICT in the education system provides for a high degree of flexibility. Flexibility in learning processes is integral as the way students are taught and learn impacts knowledge gain and insights. More than tangibles, it is the intangibles that

\textsuperscript{12} ICTs for Higher Education – Background Paper Commonwealth of Learning, Paris, UNESCO
are strongly associated in the learning process. ICT immensely impacts the intangible benefits in the entire learning process.

All sectors and disciplines of study make use of ICT particularly computers. Disciplines such as Law, Engineering, Science, Medical Sciences, Arts and Music, Architecture, Media and Communications, Social Sciences, Management, use communications technology tools in knowledge building processes and systems. Almost all sectors right from Financial, Automobile, services, Consumer goods etc are prolific users of ICT. In fact organizations in these sectors consider use of ICT as a strategic advantage. The overall strategic formulation is heavily dependent on ICT in these industries and sectors and several case studies exemplify ICT as a source of competitive advantage. The higher educational institutions are today system dependent and rely on ICT to large extent. The entire process right from admission, conduct of admission tests, capturing students data who are admitted, fee receipts and its management, teaching plans, attendance management, internal assessments, preparation of mark sheets external relations, library service, institutional management and other allied services to students etc is ICT dependent (Guri – Rosenblit, 2009).

Universities, for decades over\textsuperscript{13}, are known to be the hub of learning and knowledge. The way Universities function in terms of knowledge creators has now been impacted by technology. Though vast amount of data is available on the web, the University still holds strong grip as knowledge creators. ICT has played a lead role in this development. Universities today contribute skilled resource to any economy and businesses at large rely on University graduates for significant contribution and value addition to their existing practices. Universities have positively responded to new technological changes and initiative and have transformed their learning processes. The use of technology based learning through digital libraries; mobile connectivity,

\textsuperscript{13} India is known to be the country of education and seat of learning from several centuries ago.
cloud based data management etc have all been utilized in conduct of research and development in Universities.

To support the Universities, the University Grants Commission (UGC) has taken some ICT enabling initiatives, which are:

1. **eNetwork of Universities and colleges** - Formation of national educational resource portal wherein the data of all educational institutions will be made available through a single web portal

2. **UGC infonet** – free connectivity to all educational institutions so as enable and facilitate the institutions to leverage technology in teaching - learning, research, and institutional governance. Many higher educational institutions are part of this programme.

3. **Consortium** – wherein UGC has provided access to electronic subscription of more than 2500 scholarly journals to more than 50 Universities in the country. Creation of web enabled content which uses multimedia technology is the major focus to create quality of learning experience

4. **INFLIBNET** - UGC has created various Inter University Centers (IUCs), for connectivity network and e-content development. This consortium also has access to e-Journals.

5. **National Knowledge Network** to connect Universities and colleges throughout.

6. **EDUSAT** - UGC provides EDUSAT facility to Universities for streaming educational content in classrooms. Consortium for Educational Communication and the ‘Edusat Multi Media Research Centres’ are the nodal agencies to help leverage EDUSAT’s potential.
2.4 Rationale for ICT in Education

The works of Cross and Adam (2007) provide the following:

<table>
<thead>
<tr>
<th>Rationale</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social</td>
<td>It is the perceived role of technology in society at large and the need to acquaint students with the said technology.</td>
</tr>
<tr>
<td>Vocational</td>
<td>As jobs require certain levels of technology, it is preparing students for the jobs that require skills in technology.</td>
</tr>
<tr>
<td>Catalytic</td>
<td>Using technology to improve effectiveness and strengthen</td>
</tr>
<tr>
<td>Pedagogical</td>
<td>Teaching process, and overall management.</td>
</tr>
</tbody>
</table>

The role of ICT in education can be examined through the following categories:

a) E-learning
b) Blended Learning, and
c) Distance Learning

E-Learning referred to as Electronic learning is a generic term for computer-enhanced learning. Coupled with the field of advanced learning technology (ALT), it deals with methods, and technologies to learn, use and be aware of using networked and/or multimedia technologies. It includes technology enabled learning (TEL), computer based instruction and training (CBI/T) or internet based training (IBT). As a mode of online learning, it can be used for learning outside the classroom. It takes place through both synchronous and asynchronous learning. In the education sector, it is distance education that provided the premises for development of e-learning. The
high flexibility provided by e-learning makes it suitable for distance and/or blended learning. E-learning makes learning flexible and easy and meets the needs of learning ‘on demand’. The difficulties of physical presence, time and attendance can be overcome by e-learning. Web based discussion boards, videos, multimedia, web based textbooks are some forms of e-learning used in education. Many online courses are offered through various e-learning tools and modes.

E-learning provides facilities of mass customization of educational course content. “E-education can provide access to the best gurus and the best practices or knowledge available” (UNESCO, 2002).

E-learning facilitates both linear and collaborative learning. Linear learning is self-paced with content in a linear manner step by step. It is highly conducive to individual style of learning with high customization. Whereas collaborative learning provides learning platforms for groups of students. Information can be shared over a network leading to creative engagement and knowledge sharing among group members.

A high level of participation and greater interaction between students in groups is facilitated by e-learning thereby impacting upon students in a profound manner as compared to traditional educational methods (Bhattacharya and Sharma, 2007). Internet is the main ICT to spread education through e-learning. The typical ICT infrastructure would include learning objects or content, security infrastructure, platforms for content delivery etc. They create a digital identity of the student and other stakeholders in the academia as well as connect them to each other.

E-learning has the following advantages:

- No time and geographical barriers.
- Joint working
- Innovative delivery approaches
- Easy sharing of right content
- Advantage of getting to balance work along with learning
- Access to best and international work

**Blended Learning** is the combination of multiple ways and content delivery mechanisms. They include classroom learning, online learning as well as one on one learning and their combination.

**Face to face Learning** refers to learning that occurs in a traditional classroom setting where a teacher delivers instruction to a class of learners or it can be in the form of one on one teaching. This could include tutoring, lectures, seminars, presentations etc.

**Self paced Learning** refers to learning at your own pace, time and need: studying required chapters from text book, studying material presented through online or CBT, attending recorded classes, reading articles and research papers, working on assignments & projects, and searching & browsing the online resources.

**Online Collaborative Learning** refers to participative learning where learners and teachers work together to disseminate knowledge and build on it. ; for example:

- Synchronous interaction.
- Asynchronous interaction.

Synchronous is real-time, it involves interactions with teachers through online resources, chat rooms, virtual learning environments etc. On the other hand, Asynchronous means delayed or deferred; it involves communications over emails, forums etc.
2.5 Benefits of ICT in Education to Main Stakeholders

Students,
- Increased access,
- Flexibility of content and delivery,
- Combination of work and education,
- Learner-centred approach,
- Higher-quality of education and new-ways of interaction.

Employers,
- High quality, cost effective professional development in the workplace,
- Upgrading of employee skills, increased productivity,
- Developing of a new learning culture,
- Sharing of costs and of training time with the employees,
- Increased portability of training.

Governments,
- Increase the capacity and cost effectiveness of education and training systems,
- To reach target groups with limited access to conventional education and training,
- To support and enhance the quality and relevance of existing educational structures,
- To ensure the connection of educational institutions and curricula to the emerging networks and information resources,
- To promote innovation and opportunities for lifelong learning.

2.6 Role of ICT in Higher Education
ICT and its importance are growing exponentially all over. They have become most potent tools for diffusion of knowledge and information. Their use in the higher education has generated varied response. The use is seen from the perspective of innovative pedagogies, rapid content delivery, effective content development and quality in overall education.
2.7 Access and Equity in Higher Education

11th Plan proposed to achieve the target of 15 percent GER by 2012 through the increase in institutional capacity and increase in ‘intake capacity’ of existing educational institutions. These efforts are also experiencing the push created in this direction through the consistent rise in enrolment at elementary level and secondary level. The demand for higher education is expected to rise steeply in the forthcoming years under these influences. ICTs lend themselves as an ideal mechanism to bridge this gap by complementing both formal education system as well as distance learning systems (Neeru, 2009).

E-learning is emerging as an important strategy to provide widespread and easy access to quality higher education. E-learning is a generic term referring to different uses and intensities of uses of ICTs, from wholly online education to campus-based education and through other forms of distance education supplemented with ICTs in some way. Although, presently the initiatives for development of e-learning in India are continuing in a sporadic manner, UGC is advocating and making efforts to enhance the quality of higher education by framing policy guidelines for their integration in classroom and other activities.

2.8 Role of ICTs in Pedagogy for Quality Teaching Learning

Another most important dimension of higher education sector influenced by ICT integration is improving quality of teaching-learning. Also, the changes taking place due to globalization and internationalization attach premium to knowledge and information. Therefore, the integration of ICTs would not only help in promoting personal growth but also in developing “knowledge societies”. The call of the hour is the need to provide education for everyone, anywhere, and anytime. Life-long learning has become the driving force to sustain in the contemporary competitive
environment. Therefore to strengthen and / or advance this knowledge-driven growth, new technologies, skills and capabilities are needed.

Conventional teaching-learning processes are undergoing a paradigm shift. Focus of instruction is now on education programs/practices that promote competency and performance. Such curricula tends to require access to variety of information sources, information forms and types; student centred learning settings based on information access and inquiry; learning environments centred or problem-centred and inquiry-based activities, authentic settings and examples; and teachers as coaches and mentors rather than content experts (Neeru, 2009). The shift towards development of educational programs is well supported by and encouraged by the emerging instructional technologies.

Apart from enhancing student’s learning experience, role of ICTs in capacity building/training of educational personnel has very large potential. National level institutes can provide leadership role in enhancing technical and managerial manpower in different disciplines through ICT networks and collaborations. Technology facilitated learning would result in preparation of staff regarding innovative pedagogic methods, new ways of learning and interacting, easy sharing of new practices among teaching community and result in widening the opportunities for their participation. The capabilities of competent and trained teachers/academic experts can be made available to larger audiences/students through flexible and virtual settings.

### 2.9 Innovative Approaches to Teaching

ICTs have the potential to drive innovative and effective ways of teaching-learning and research. The inclusion of learning tools, easier use of multimedia or simulation tools, easy and almost instant access to data and information in a digital form which
allows for computations and data processing generates possibilities which were otherwise not feasible. The possibility to diffuse these innovations and complement the learning content to improve quality in higher education through innovative pedagogic methods is high. The focus on ICTs to back quality research through utilization of rigorous research methodology and in-depth analysis is the call of the hour.

Indian higher education will see plethora of technology trends and effects of technology adoption. Of course, most of the global technology trends may not be seen implemented in near future. But definitely many global technologies are trending in India too. Technology will play a crucial role in defining the way higher education is imparted.

Here are some of the exciting trends in technology in Indian higher education system –

Open Education Resources
AICTE, IGNOU, UGC are taking efforts to explore and create open education sources. They vary from development tools and platforms to ready-made content. Various technologies like telephony, internet, audio video etc. are being used.

Meta University / Virtual Technical University
While NMEICT is working on Virtual Technical University, there are some experiments already underway to create pioneering Meta University where more than two universities come together and offer joint programs virtually. Students get to choose courses from various universities and still complete a degree program.

Digitization of Books (E-Text Books)
There is an increased trend towards creation of a digital repository of books to create a digital learning environment for students. The digital version of the books embedded with text, pictures along with video, simulations and visualizations help students learn the concepts in an interactive way. The National mission on Education through ICT plans to generate new online course content for UG, PG and Doctoral education. Efforts are already underway to prepare course content for 130 courses (UG and PG). IT Adoption, Challenges, Benefits and our offerings to universities

Content Delivery using IT/ICT
Higher Education is purely a content driven play where educational content is delivered through innovative use of ICT. There is an increased trend in higher education institutes to render content through Radio, TV and Satellite

Mobility
With the proliferation of mobile phones on campus, colleges everywhere are compelled to capitalize on feature-rich phones that are capable of much more than just voice calls. Adoption of the BlackBerry, iPhone and other smart devices that have Internet access allows students and faculty to perform a wide range of assignments. Tasks like administration, sharing class notes, downloading lectures, instant messaging, etc., are possible anywhere cell phone service is available.

Mobile phones are also being used to access computer files from remote locations. With services like “Soonr”, students who have forgotten to bring an assignment to class can use their cell phone to access the completed work on their home computer and show it to the professor.

Social Learning
The emergence of Web 2.0 and social networking such as blogs and wikis, as well as new online video repository and delivery websites such as YouTube, iTunes U and
Big Think is influencing a new trend in higher education. The emergence of smartphones such as the iPhone and other intelligent devices has enhanced mobile learning (referred to as m-learning). These technologies create new channels for content delivery, online video expansion and podcasting. Also, the adoption of virtual reality websites such as “Second Life” has provided higher-education institutions with new venues for class gatherings and learning. IT Adoption, Challenges, Benefits and our offerings to universities. A combination of Web 2.0 tools viz., Blogs, Wikis, Podcasts, Mashups, and Social Networking Communities are transforming the traditional learning environment into something more social and personalized. While traditional Learning Management Systems (LMS) like Blackboard, Sakai, Moodle or Web CT are course-centered and driven by faculty, the new trend in education is to create a “learner-centric” system.

2.10 Conclusion

As is evident from the chapter, there have been tremendous efforts taken in ICT implementation at various levels. Be it the government authorities or institutions, many initiatives have been planned for the adoption of technology in teaching learning. At the same time, there have been a lot of developments on pedagogical aspects of teaching and innovative ways of using technologies in education. All of this seem to be very overwhelming many times when considering an educator’s perspective. Educator in India who has taken this as a major paradigm shift from conventional teaching and learning, also needs to be heard for the successful implementation of ICT. This chapter is important from perspective of setting up the tone of the study and scope it with required explanations of terminologies as well as expanse of higher education sector in India.