CHAPTER- I
INTRODUCTION

1.1 Introduction

 The first chapter explains the background of the research study, statement of the problem and research questions. It also gives an account of India as a nation, its geographical, social profile and a brief introduction of Assam as the research study is conducted in this state. It also provides the research objectives and describes the structure of the thesis with a short description of each chapter. The definitions of key terms are also provided to capture the main components of this study. Finally, it concludes with a chapter summary.

1.2 Background

India, officially the Republic of India, is a country in South Asia. It is the seventh-largest country by area, the second-most populous country (with over 1.2 billion people), and the most populous democracy in the world. It is bounded by the Indian Ocean on the south, the Arabian Sea on the southwest, and the Bay of Bengal on the southeast. It shares land borders with Pakistan to the west; China, Nepal, and Bhutan to the northeast; and Myanmar (Burma) and Bangladesh to the east. In the Indian Ocean, India is in the vicinity of Sri Lanka and the Maldives. India's Andaman and Nicobar Islands share a maritime border with Thailand and Indonesia.

The Indian subcontinent was home to the urban Indus Valley Civilization of the 3rd millennium BCE. In the following millennium, the oldest scriptures associated with Hinduism began to be composed. Social stratification based on caste, emerged in the first millennium BCE, and Buddhism and Jainism developed in due course of time. Early political consolidations took place under the Maurya and Gupta empires; the later peninsular middle kingdoms influenced cultures as far as Southeast Asia. In the medieval era, Judaism, Zoroastrianism, Christianity, Islam arrived and Sikhism emerged, all adding to the region's diverse culture. Much of the north fell to the Delhi sultanate; the south was united under the Vijayanagara empire. The economy expanded in the 17th century in the Mughal empire. In the mid-18th century, the subcontinent came under British East India Company rule, and in the mid-19th under British crown rule. A nationalist movement emerged in the late

Figure 1.1 Map of India (https://www.mapsofindia.com/)

19th century, which later, under Mahatma Gandhi, was noted for non-violent resistance and led to India's independence in 1947.

In 2015, the Indian economy was the world's seventh largest by nominal GDP and third largest by purchasing power parity. Following market-based economic reforms in 1991, India became one of the fastest-growing major economies and is considered a newly industrialized country. However, it continues to face the challenges of poverty, corruption,

malnutrition and inadequate public healthcare. A nuclear weapons state and regional power, it has the third largest standing army in the world and ranks fifth in military expenditure among nations. India is a federal republic governed under a parliamentary system and consists of 29 states and 7 union territories. She is a pluralistic, multilingual and multi-ethnic society and is also home to a diversity of wildlife in a variety of protected habitats.

India's total area is 3,287,263 km^2 (1,269,219 sq mi) out of which 9.6% is water. According to 2011 census India's population is 1,210,854,977 which is estimated to 1,326,572,000 by 2017 and population density is 393.2/km^2 (1,018.4/sq mi).

India's GDP (nominal) estimated by 2017 is $2.454 trillion ($1,850 per capita) and GDP (PPP) estimated by 2017 is $9.489 trillion $7,153 per capita. (Source: https://en.wikipedia.org/wiki/India)

Assam is a state in north-eastern India, south of the eastern Himalayas along the Brahmaputra and Barak (river) vallies. Assam covers an area of 30,285 sq mi (78,440 km^2). The state is bordered by Bhutan and the state of Arunachal Pradesh to the north; Nagaland and Manipur to the east; Meghalaya, Tripura, Mizoram, and Bangladesh to the south; and West Bengal to the west via the Siliguri Corridor, a 22 kilometres strip of land which connects the state to the rest of India.

Assam is known for tea and silk. The first oil well in Asia – Digboi - was drilled here. The state has conserved the one-horned Indian rhinoceros from near extinction, along with the wild water buffalo, pygmy hog, tiger and various species of Asiatic birds. It provides one of the last wild habitats for the Asian elephant. The Assamese economy is aided by wildlife tourism to Kaziranga National Park and Manas National Park, which are World Heritage sites. Sal tree forests are found in the state which as a result of abundant rainfall, looks green all year round. Assam receives more rainfall compared to most parts of India.
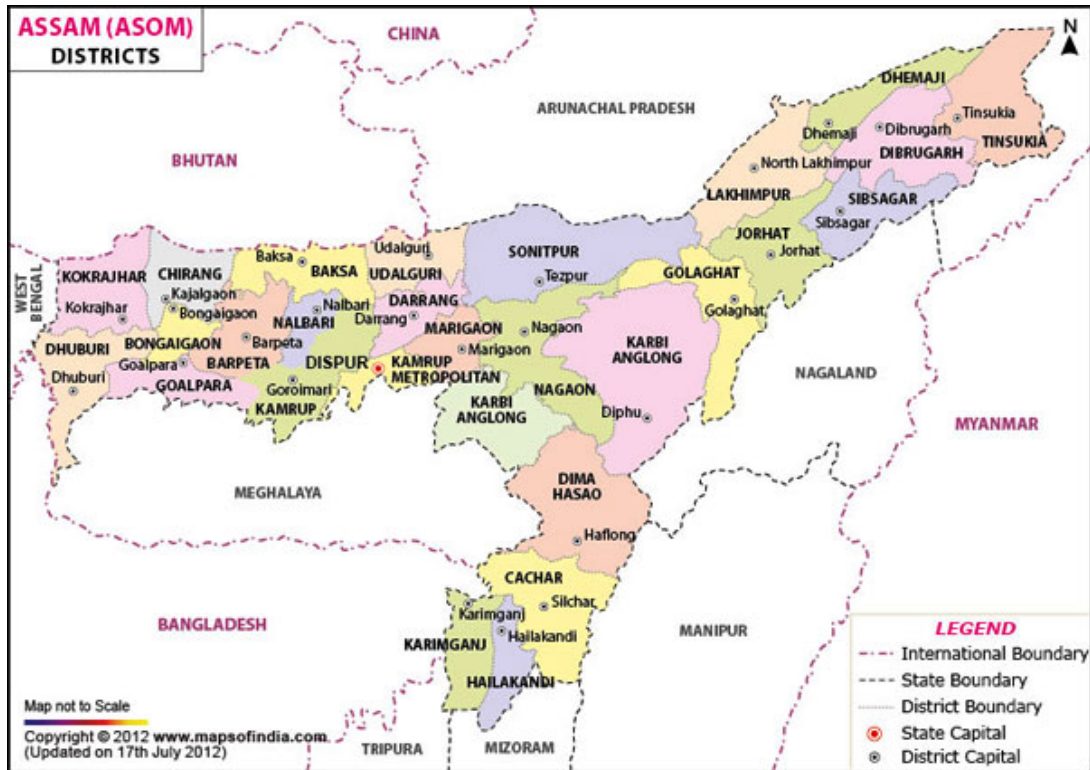
Figure 1.2 Map of Assam (https://www.mapsofindia.com/maps/assam/assam-district.htm)

Assam's total area is 78,438 km^2 (30,285 sq mi). According to 2011 census India's population is 31,205,576 and population density is 400/km2 (1,000/sq mi). (Source: https://en.wikipedia.org/wiki/Assam)

1.2.1 ICT in Indian education

Importance of education in almost all walks of life has increased with the support of information and communication technologies (ICT). During the past 20 years, the use of ICT has fundamentally changed the world of education at all levels. In the current times, the importance of education and acceptability of ICT as a social necessity has been increasing. Social acceptability of ICT tools is necessary to improve the mobility in the society and increase the pitch for equity and social justice (Hoque & Alam, 2010).

ICT acts as a powerful agent to change many of the educational practices in HEIs. As students and teachers gain access to technology, more direct forms of communication and access to resources, which can be shared, the capability to support these quality-learning

4

standards would continue to grow. ICT applications provide institutions with a competitive edge by offering enhanced services to students and faculty, driving greater efficiencies and creating enriched learning experiences.

The Government of India has taken ICT initiatives in a big way and has laid down a National ICT policy, reflected and implemented through various government departments and ministries. It is being implemented through vigorous activities of National Informatics Center (NIC) and encouragements form University Grants Commission (UGC), All India Council of Technical Education (AICTE) and Department of Science & Technology (DST) throughout the country. National Association of Services and Software Companies (NASSCOM) have also played a crucial role in the formulation of these policies (Sharma & Singh, 2010).

Following are a few case studies that clearly show the growing footprint of IT / ICT in Indian higher education.

A) **National Mission on Education through Information and Communication Technology** (NMEICT) is envisaged as a centrally-sponsored scheme to leverage the potential of IT / ICT, in teaching and learning process for the benefit of all the learners in HEIs in anytime anywhere mode. Content generation and connectivity along with provision for access devices for institutions and learners are the major components of the mission. So far, nearly 400 universities have been provided 1 Gbps connectivity under National Knowledge Network (NKN) and more than 14,000 colleges have also been provided VPN (Virtual Private Network) connectivity.

A number of other projects have been sanctioned for innovative use of IT / ICT. Some of them are:

B) Creation of e-content for 996 courses in Phase-II in Engineering, Sciences, Technology, Humanities and Management has been undertaken by IIT Madras.

C) Consortium for Educational Communication has been tasked with creation of e-content for 87 undergraduate courses

D)   UGC has cleared a proposal to publish e-content for 77 post-graduate courses

E) **National Programme on Technology Enhanced Learning (NPTEL)**, a joint initiative of the IITs and IISc provides E-learning through online Web and Video courses in Engineering, Science and Humanities streams aiming to enhance the quality of engineering education in the country by providing free online courseware.

F) **The National Knowledge Network (NKN)** and **Connected Digital** has launched an initiative to cover 1,000 institutions besides providing digital campuses, video-conference classrooms, wireless hotspots, laptops / desktops to all students of professional / science courses and Wi-Fi connectivity in hostels. A major development during 2011 has been the launch of *Aakash* – the low cost computing tablet on 5th October, 2011. An amount of Rs. 47.72 crore has been released to Indian Institute of Technology, Rajasthan, for the projects pertaining to acquisition and testing of low cost computing devices under the scheme of NMEICT.

G)   Using the A-View software developed under the NMEICT, there has been a 14 day teachers' empowerment programs conducted for batches of 1,000 teachers at a time by IIT Bombay and are contemplating a plan to conduct a two-week long teacher training programme for a batch of ten thousand teachers at a time. This program, developed under NMEICT, could become the bedrock for successful implementation of the proposed National Mission on Teachers.

H)   Under the N-List program of INFLIBNET, being run under NMEICT, lakhs of e-books and thousands of e-journals have been made available to colleges and universities with a view to inculcate research culture in teachers and students. The model needs to be scaled up for maximizing the coverage and productive usage of the resources made available.

I)   IIT-Bombay has started the programme of CDEEP (Centre for Distance Engineering Education Program) as emulated classroom interaction through the use of real time interactive satellite technology (Centre for Distance Engineering Education Program, India, 2007).

J)   The launch of EDUSAT brought satellite connectivity to large parts of rural India. Indira Gandhi National Open University (IGNOU) is leveraging satellite, television, and internet technologies to offer online courses.

K)   Private sector participation like HP's *Technology for Teaching Grant* has transformed the ICT infrastructure in institutes like Anna and Jadavpur Universities.

L)   In 2007, the Distance Education Council (DEC) allowed all premier institutes in the country to offer online courses. Since then IIM-Cochin, IIM-Bengaluru, IIM-Kolkata, XLRI, Ranchi and other management institutes have started offering courses in association with private players like Hughes, Reliance, NIIT, etc.

M)   IIT-Kanpur has developed Brihaspati, an open source e-learning platform.

N)   An increasing number of private players like Hughes Global Education, Manipal Education Group, Centum Learning, UEI Global, Shiv Nadar University, etc. are offering online education courses in association with leading central and state universities leveraging with good ICT infrastructure.

Technology plays a bigger role in transforming higher education imparted by universities to the next level. The tools help to create a social, highly-collaborative and personalized environment with innovative solutions that will enhance the way students learn, communicate and collaborate and study both on and off campus.

Some of the exciting technology trends in Indian universities are:

i) 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 NMEICT 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).

ii) 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.

iii) Open Education Resources

Many Indian universities are contemplating technology enabled free access of education resources. AICTE – Indian National Digital Library in Engineering & Technology (AICTE – INDEST) is a consortium set up by the Ministry of Human Resources Development (MHRD) of the Government of India to enhance greater access and generate annual savings in access of bibliographic databases. UGC has also launched its Digital Library Consortium to provide access to peer reviewed journals and bibliographic databases covering subjects such as arts, humanities, technology and sciences.

iv) Virtual Technical University

The NMEICT has been working on a war footing to establish a virtual technical university to impart training to UG/PG students along with new teachers.

v) 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 where cell phone service is available.

vi) 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.

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.

1.2.2 Indian National Policy on Education

For the all-round development in Access, Equity and Quality of education, Government of India framed the education policy as "National Policy on Education (NPE) in 1986, and modified in 1992 (MHRD, 1998). The vision, mission and the policy goals as laid in the policy are:

i) Vision: The IT / ICT policy in Education aims at preparing youth to participate actively in the establishment, sustenance and growth of a knowledge society leading to all round socio-economic development of the nation and enhanced global competitiveness.

ii) Mission: Device catalyzes, support and sustain IT / ICT and enabled activities and processes in order to improve Access, Equity and Quality.

iii) Policy Goals: To achieve the above Vision and Mission, the IT / ICT policy in education will work towards:
- ➢ Creating an environment in the states to develop IT / ICT knowledgeable community
- ➢ Creating an IT / ICT literate community who can deploy, utilize, benefit from it and contribute to nation building
- ➢ Create an environment of Collaboration, Cooperation and Sharing, conducive to

the creation of demand for an optimal utilization of and optimum returns on the potentials of IT / ICT in school / higher education

- ➢ Promote universal, equitable, open and free access to state-of-the-art IT / ICT enabled tools and resources to all students and teachers
- ➢ Promote development of localized quality content and enable students and teachers to partner in the development and critical use of shared digital resources
- ➢ Promote development of professional networks of teachers, continuing education of teachers; guidance, counseling and academic support to students
- ➢ Promote research, evaluation and experimentation in IT / ICT tools and enabled practices in order to inform, guide and critically utilize the potential of IT / ICT in education
- ➢ Motivate and enable wider participation of all sections of society in strengthening education through appropriate utilization of IT / ICT.

1.2.3 Higher Education in India

Higher education plays a pivotal role in the development of a country, as it is viewed as a powerful means to build a knowledge-based society. The main governing body University Grants Commission (UGC) enforces its standards, advises the government, and helps coordinate between the Centre and the state for higher education-related work in India.

According to All India Survey on Higher Education (AISHE) released by the Ministry of Human Resource Development (MHRD, 2016), the Gross Enrolment Ratio (GER) of India is 24.5% in age group of 18-23 years. The government aims at providing access to educational opportunities to all who desire and need it and achieve a GER of 30% by 2020. Besides enhancing the quantum of teachers in colleges and universities there is also the need to improve their quality. According to the report on the status higher education institutions (HEIs) in India for the last four years as follows:

As per the report there are 799 Universities in India out of which 43 Central Universities, 01 Central Open University, 329 State Public Universities, 13 State Open Universities, 01 State Private Open University, 197 Private Universities, 75 Institutions of National

Importance, 05 Institution Established Under State Legislature Act, 32 Government Deemed Universities, 79 Private Deemed Universities, 11 Government Aided Deemed Universities and 13 other Universities.

Table 1.1: Growth of Educational Institutions in India from 2012-13 to 2015-16

Institutes	2012-13	2013-14	2014-15	2015-16
No of universities	667	723	760	799
No of colleges	35,525	36,634	38,498	39,071
Stand-alone institutions	11,565	11,664	12,276	11,923

(Report of All India Survey on Higher Education, MHRD, 2012-16)

As part of the expansion observed throughout the country, there have been some important developments in the field of higher education in Assam. The establishment of two central universities, one Indian Institute of Technology (IIT), one Indian Statistical Institute (ISI), 11 State universities, few private professional universities and colleges and the proposal to set up more such institutions are going on.

Table 1.2: Educational Institutions in Assam

Institutions in Assam	Nos.
Central Universities	2
State Universities	11
Private Universities	5
Autonomous Institutions	4
Research institutes	7
Medical College	6

Sources: Directorate of Higher Education, Assam (http://dheassam.gov.in/)

In the whole of the North-Eastern Region (NER) of India, Assam is the hub for higher educational institutions. The presence of institutions like the National Institute of Technology, Silchar; Indian Institute of Technology, Guwahati; and North East Institute of

Science and Technology, Jorhat add stature to the higher education scenario of Assam.

1.3 The purpose of the study

According to the National Policy on Education (NPE) framed in 1986, and modified in 1992, there is significant disparity in ICT usage between institutions in urban areas and those in semi-urban / rural parts of the country. The quality of ICT infrastructure and its use is limited in a large percentage of autonomous / affiliated Colleges especially due to lack of trained IT staff, connectivity issues and shortage of funds (MHRD, 1998).

Further, the extension of quality education to remote and rural regions becomes a Herculean task for the country with multi-lingual and multi-cultural population separated by vast geographical distances, and many inaccessible terrains. The rapid increase in mobile penetration and evolution of 4G wireless technologies such as WiMax / LTE it is expected that broadband connectivity issues can be resolved by the end of the 12th five-year-plan (2012-2017) in semi-urban / rural parts of the country (Planning Commission, Government of India, 2013).

The lack of adequate educational infrastructure and non-availability of good teachers in sufficient numbers adversely affect the efforts made in education, according to Sarkar (2012). In order to correct the imbalances in the infrastructure and shortage of competent teachers the planners have derived ways of utilizing various electronic media in the field of education. In this age of a techno-scientific revolution, the sheer quantity of knowledge and information is expanding exponentially. The needs of education are growing constantly and the student populations are burgeoning. For this purpose new communication technologies like radio, TV and internet are exploited vastly in India. Most of the advanced countries have adopted these technologies for the development of higher education.

In this context, the quality of training and teaching in higher education institutions also demand urgent attention. The advances in ICT provide great opportunities to enhance the quality and reach of teaching and learning in higher education with both on-campus and

distance education initiatives. All those who require updating of their knowledge and life-long education can now be benefited by the modern facilities of communication. They also provide increased access to information sources and facilitate communication among researchers and teachers and the building of networks of institutions and scholars.

According to Saiprasad (2001), there is a need to assess the knowledge gains accruing to the members of the target group as a result of listening and viewing the educational programmes through available media. At present, data on benefits derived by students out of using educational mass media are available mainly in the form of feedback letters reaching the channels. Occasionally, individual producers of the programmes like media research centers and media organizations have been conducting research within local audiences, about specific programmes using separate research methodologies and design. However, there has been no study in the Indian context that spans all the different media within the same study, covering respondents of multiple locations, modes of study, medium of instruction, gender, subject of study and other strata. The present study is an attempt to bridge this research gap.

The findings of the research study are expected to provide usage patterns of each particular medium, comprising different educational programmes, by a large section of the student population, taken as a whole.

Futuristic research is useful for prediction, forecast and envisioning. Through existing research, efforts about evaluation are being made to improve the programme quality in terms of inputs at the production end. At the receivers' end, research is confined to eliciting reactions on programme quality and sporadic assessment of viewership patterns. Few efforts were made in the past to assess the actual knowledge gains and to relate them to the programme components. Thus, there is a need to explore and find out the utility of new media technologies, which are being used for education now and project their future utility.

Possibly the greatest contribution that this study shall bring in is its approach to remain relevant and withstand the rapid changes of technology. Many previous studies examining the adoption of ICT into mainstream learning have focused on what is being done with technology rather than on its effect. Consequently, when the specific technology becomes obsolete, the research risks becoming obsolete and its findings lose relevance. It is hoped that this study will stand the test of time by focusing on a process of change rather than a process of implementation. The distinction here is that change concerns the personnel involved, whereas, implementation concerns the technology involved.

1.4 Significance of the study

The study is assumed to have an added value for further research on ICT utilization focusing on Assam that can address all universities and colleges. There is a lack of literature identifying the factors that affect the adoption of ICT in higher education in the context of Assam. This research study will contribute to the literature and address the need to develop an ICT adoption framework suitable for Assam.

1.5 Statement of the problem

This study examines the ICT utilization in four universities of Assam. Two central universities: Tezpur University (TU) and Assam University (AU) and two state universities: Gauhati University (GU) and Dibrugarh University (DU). The study is based on a survey of teachers, students, ICT expert and administrators, examining the following objectives:

1. To assess the existing ICT facilities in higher educational institutions (HEIs) in Assam,
2. To assess the extent of ICT utilization in the teaching learning process (TLP) by the HEIs in Assam,
3. To examine the problems and prospects of integration and usage of ICT in HEIs in Assam,
4. To explore the scope for improving the present status,

1.6 Research Questions

Drawing from the theoretical propositions and establishing a lack of knowledge on major ICT academic, instructional and logistical infrastructure enumerated in subsequent chapters, the following research questions were examined:

RQ1. What kind of ICT tools and methods are being used in the universities of Assam?

RQ2. How do users perceive ICT and its benefits in their pedagogy?

RQ3.What are the perceived issues that hinder proper integration of ICT into their pedagogy?

1.7 Information and Communication Technology

The phrase 'information and communication technologies' was originally coined by Stevenson (1997) in his report to the United Kingdom government, and promoted by the new National Curriculum documents for that country in 2000. Stevenson (1997) described ICT in the context of education as the study of the technology used to handle information and aid communication. Since then, other definitions have emerged that describe ICT as traditional computer application with the addition of communication tools such as e-mail, chat-rooms and other Internet resources. For example, UNESCO (2007) provides the following definitions to serve as a guide:

Information technology (IT) is the term used to describe the items of equipment (hardware) and computer programmes (software) that allow us to access, retrieve, store, organize, and make various permutations and combinations depending upon the need and present information by electronic means. Personal computers, scanners and digital cameras fit into the hardware category. Database storage programmes and multimedia programmes fit into the software category.

Communication technology (CT) is the term used to describe telecommunications equipment, through which information can be sought and accessed, for example, phone, fax, modem and computer (UNESCO, 2007). The recent addition of 'communication' to

previous terms such as information technology (IT) emphasizes the growing importance placed on the communication aspects of new technologies (Anderson, 2002). Accordingly, the working definition adopted in this study defines ICT as any form of technology, be it analogue or digital, used as an educational tool for information or communication purposes. What it does not include are traditional learning tools like pencil and paper, blackboards or whiteboards, although electronic whiteboards would be included in this definition.

Prior to the widespread use of the term ICT, the phrase 'learning technologies' was commonly used to refer to computer-based learning environments, but could include any resources, such as methods, tools, or processes that are used for handling any activities involved in education (Pea, 1998). In the current study, the terms 'ICT' and 'learning technologies' are used more or less interchangeably.

1.8 Role of ICT in Higher Education

Role of ICT in higher education is solicited for improving quality, widening access and enhancing operational efficiency across all functions in higher education sector and to create new dynamics in this domain both at micro and macro levels (Meenakumari & Krishnaveni, 2010). Introduction of ICTs in higher education has profound implications for the whole education process ranging from investment to use of technologies in dealing with key issues of access, equity, management, efficiency, pedagogy, quality, research and innovation. ICT applications provide institutions with a competitive edge by offering enhanced services to students and faculty, driving greater efficiencies and creating enriched learning experiences.

1.8.1 ICT in Teaching and Learning

While for the higher education sector, it has been planned to build a knowledge repository of multidisciplinary subjects, as a strategy to counter the shortage of faculty in higher education, EDUSAT has been in use to share the available expertise through modular programmes. This was to be done by networking institutions, creation of virtual laboratories and database, access to expert lectures and technological developments in

industries and research organizations etc. Teaching and learning can further be improved by replacing of conventional teaching instead of the usual age old method of chalk and talk by innovative methods like Power point presentations and animations, modeling and simulations, video clips and using audio-visual (AV) aids, LCD projectors etc. This enhances the learning ability of the student and also helps the teacher to elaborate the difficult concepts effectively within a short time span. Seminars of the students can also be arranged allowing the references to be done using internet and the presentations using high tech display devices as LCD projectors. Different online programmes and courses of universities across the world are made available for students in the internet centers in collaboration with the universities. (Desai & Shah, 2009). ICT in higher education changes the view of learning from teacher-centered to student-centered learning system and the teachers are the facilitators, coaches and mentors where ICT support the learning environment to students.

Some of the supporting environments in this regard are:

i) Tele-Education System - It is the application of space technology in education. An integrated network system comprising of EDUSAT, Broadband and V-SAT networks helps in bringing virtual class rooms in a multi-class environment with seamless two-way interaction between the teachers and students in a collaborative environment.

ii) Virtual Learning Campus (VLC) -Virtual Learning Campus or VLC is an approach that divides the responsibility of building, commissioning and running the different systems and information infrastructure for education like broadband, EDUSAT and ERNET services, synchronous class room environment, asynchronous knowledge interaction environment, servers and portals, e-learning & digital library, ERP management solutions etc. under centers of specializations in different Institutions and disciplines. Students in any college may access the services over the web. The college itself needs to maintain basic e-learning and library portals for convenience and providing convenient access to information.

iii) Virtual libraries and digital learning - Teachers and students able to get information quickly and conveniently. Distance education requires virtual libraries. It provides text, video, audio, and other formats for teaching and learning and support digital learning. They collect and organize information and help the users to use the right information at the right time (Schmitz, 2004). Digital education creates changing patterns for students, teachers, librarians, and others. This new pattern will increase the role of curators in this process. In a virtual library, librarians become curators who do not merely collect, organize, and lend material, but are also leaders, researchers, information seekers and analyzers. A virtual library curator is a powerful person in managing a great volume of data (Husler, 1996).

iv) Distance Learning - It is a type of education where students work on their own at home or at the office and communicate with faculty and other students via e-mail, electronic forums, video conferencing, chat rooms, instant messaging and other forms of computer-based communication. It is also known as open learning. Most of the distance learning programmes include a computer based training (CBT) system and communication tools to produce a virtual classroom.

v) Wireless connectivity (wifi) - Wireless campus benefits both students and teachers. Wireless environment will help faculties to mold the future workforce, improve campus efficiency, streamline operations and enable real time connectivity through any device. Students will benefit through exposure to technology and expect services such as video conferencing, virtual class rooms and social media access through high speed internet connection. Furthermore, the students adopting tablets and other devices, many educational institutions are embracing the concept of 'bring your own device' to enhance learning and teaching. Going wireless helps as it addresses the need to be connected constantly and provide seamless networking, ensuring improved student engagement with technology.

1.8.2 ICT in Administration

ICT in administration of educational institutions play a major role in efficient utilization of existing resources and simplifies the administrative tasks by reducing the paper work. It also replaces the manual maintenance of record keeping to electronic maintenance of records which helps in easy retrieval of any information of students, staff and general within a fraction of a second. In administration ICT helps in three ways:

i) Student administration: ICT helps in maintaining the students' personal profile, academic track record, placement participation, alumni record, assessment etc. And it helps in student learning activities like assignment uploading and course material downloading, attending quiz, online tests and preparing classroom and project presentations and access the information for career enhancements, attendance record in some institutions, biometric attendance facilities, communicating academic details of students to parents via mail and sending text message, availability of time tables and course schedules in electronic form, etc.

ii) Staff administration: ICT helps in maintaining the staff personal profile like personal details, pay scale, and grade, performance records common for teaching and non-teaching staff. For teaching administration ICT plays a pivotal role in assessment of teaching performance, research work, preparation and presentation of learning materials, duties and responsibilities etc.

iii) General administration: ICT helps in office and managerial administration like maintaining financial records of the institutions, networking with other institutions, companies and agencies for business transactions and dealings, issue notifications, facility of online fee payments, scheduling of examinations and allocation of e-hall tickets to students, online student admissions process and communicating people for events and programmes etc.

1.8.3 ICT in Research

The integration of ICT in Indian higher education enhances the quality of research work and more number of individuals enrolled in the research work in various fields. ICT facilitates the links across the world in all subjects and social networking. It saves time; money and effort of the researchers in their studies like they can collect data of large population with a single e-mail and retrieve data in a fraction of a second. Also, through the availability of various software the analysis of the research work become much easier. The unprecedented growth in bandwidth and computing power provide opportunities for downloading huge amount of data and can perform complex computations on them in a fast manner to get an accurate and reliable data. The researchers have a provision of online access of thousands of journals, articles, e-books and publications etc. for their research work and the researcher has option to submit online publications.

1.8.4 ICT as a change agent in higher education

The evolution of higher education in India combined with the need to sustain and be competitive in a global scenario requires decisions to be taken quickly and effectively. This has enhanced the scope and complexity of administration, thus making it necessary to adopt different methods of higher education administration.

The increasing student population in higher education accelerated the need for ICTs to process, store and retrieve data in a fast, systematic and accurate manner. The focus of e-administration in higher education is on the creation of an efficient electronic administration by handling existing resources economically. It aims at adding value to the education sector by simplification of a lot of diversified management and administrative tasks and processes. According to Kaul (2006), the usage of ICT in higher education institutions starts from the early stages of receiving e-notifications regarding admission, course schedules, and billing procedures and continues till the end of the course including online publication of results.

The concept of moving the traditional classroom of desks, notebooks, pencils, and blackboard to an online forum of computers, software, and the internet intimidates many

teachers who are accustomed to the face-to-face interaction of the traditional classroom (Sarkar, 2012). ICT changes the concept of teacher-centric learning to student-centric learning and teachers act as coaches, mentors and knowledge facilitators and the learning environment focuses on a real time problem solving methods. Learning is an active process of constructing knowledge rather than acquiring knowledge and that instruction is the process by which this knowledge construction is supported rather than a process of knowledge transmission (Duffy & Cunningham, 1996). The use of ICT in learning settings can act to support various aspects of knowledge construction. Also as more and more students employ ICTs in their learning processes, the impact of this will become the more pronounced (Oliver, 2000).

ICT applications provide a lot of options and choices and many institutions are now creating competitive edges for themselves through the choices they are offering to the students. These choices extend from when students can choose to learn to when and where they teach (Oliver, 2000). ICT according to a number of commentators, enhance teaching, learning, and research, both from the constructivist and instructive theories of learning. However, the changes in professional practices enable teachers to design and incorporate more complex real world projects using ICT tools and resources.

In many countries, demand for higher education far outstrips supply and governments and institutions are turning more and more to the use of ICT to bridge the access gap. It is too early to say whether the role of ICT in the teaching function of higher education is truly transformative, or whether it is simply a re-packaging of previous pedagogy.

ICT makes possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the internet and the World Wide Web, a wealth of learning materials in almost every subject

and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number (Sarkar, 2012).

ICT in the form of Management Information System (MIS) are becoming increasingly universal. The wide adoption of ICT calls for mindsets and skill sets that are adaptive to change. An attitude of resistance to change is often caused by the lack of appreciation of the benefits brought in by ICT. But the changing life styles and emerging new cultures of the people force them to change and adopt new technology in order to sustain in the changing new world.

Integration of ICT in educational institutions has enabled a decrease in the drop-out rate amongst distant learners enrolled with the institute. Student data related to academics, fees and administration can be tracked accurately and real-time, accurate MIS reports on various aspects of academia, administration and finance are readily made available to the management which assists them in taking key strategic and policy decisions from time to time (Mujumdar, 2010).

Researchers search for information more on web and digital library rather than the library book shelves and computer has become mandatory for research work. Information technology changes the concept of traditional method of research work and made the researchers to do more feasibility and reliability studies. With the evolution of ICT, researchers can complete their research work in a short period of time and motivates many upcoming researchers to handle more research works.

1.8.5 ICT as a change agent in society

The last two decades have seen a critical examination of the role of higher education institutions in economic growth and social development. In addition to teaching and research, contributing to regional economic growth through innovation is now perceived as the third role of universities. The university-industry-government linkage as a triple-helix model through which effective transfer of technologies leads to economic growth. (Balasubrmanyam, 2009).

The developmental role of higher education institutions can be seen from its initiatives and impacts in addressing social issues such as poverty, inequality, gender, environment and empowering the poor and marginalized sections of the society to play a major role in the developmental process. The government is proposing creation of a high-speed knowledge network providing connectivity across education institutes. The same should be created at the earliest and connectivity should be provided to all recognized institutes to supplement the current networking initiatives being undertaken, intra and inter- disciplinary networks to enhance research collaboration between students and teachers should be promoted. This can also be supplemented by creation of online communities of practice.

Current business world is connected by networks and perform operations very flexibly at any place in the world. It adds the economic value to the nation and develops the society to a large extent. ICT promotes generation of new business and occupation opportunities for a large number of populace. The business from software development to travel agency and growth of new occupations like IT developers, IT assistant etc. help in generation and growth of new business and employment that will strengthen the economy, reduce unemployment and enhance the standard of living of society.

ICT is a connectivity agent as it connects the people at any place of the world through various devices. Initially information passes from one person to another by pagers and faxes and later with increasing technology people got connected through telephones, mobiles, emails and social networks etc. Perhaps it helped the people to utilize the resources as with the changing environment and develops new trends in the society. ICT adds value to the processes of earning, and in the organization and management of learning institutions. The internet is a driving force for much of the developments and innovation in individuals, business organizations, educational institutions and society at large.

1.9 Chapterization of the Thesis

This thesis comprises the following chapters - introduction; literature review; research methodology; analysis, findings and discussion; summary, implications and conclusion.

Chapter One - Introduction

Chapter one explains and outlines a general introduction about the research, research background, statement of the problem and research questions. This also discusses the higher education status in the context of India and Assam.

Chapter Two – Review of Literature

Chapter two sets the context for this study by examining the literature from the fields related to the research topic, which includes ICT and higher education. This chapter identifies the factors associated with using ICT in higher education in Assam.

Chapter Three – Theoretical Framework

Chapter three highlighted the theoretical framework, which are appropriate to this research. The theories and model selected for this study are Technology Acceptance Model (TAM) and Diffusion of Innovation (DOI). TAM is used in the acceptance and usage of information technology. DOI is a theory that seeks to explain how new ideas and technology spread through various environments. UNESCO's continuum model of ICT development is selected as a practical model for adopting ICT in the higher education context.

Chapter Four – Research Methodology

Chapter four explain the data collection methods used in this research. The main data collection was primarily based on interviews, qualitative survey and document review. The chapter explains the measures taken to ensure the standard of qualitative research with respect to this study. The chapter also describes ethical considerations, confidentiality and anonymity.

Chapter Five – Findings, Analysis and Discussion

Chapter five contains the analyses of data and its interpretative findings. The findings were discussed thoroughly according to the research objectives.

Chapter Six – Summary, Implications and Conclusion

Chapter six presents a summary of the entire thesis. This chapter provides an overview of the research motivation and a summary of key findings. The concept of generalizing findings to other HEIs, the risks and limitations of this research, and its contribution to knowledge and research novelty is explained. The chapter concludes by providing practical suggestions for further research and final comments from the researcher.

1.10 Definition of key terms

Higher Education - Higher Education is post-secondary education conducted at colleges or universities. In the context of higher education in Assam it is defined as any qualification attained above the 10 + 2 level of studies.

Information and Communication Technology (ICT) - ICT are technologies such as computers, the internet, broadcasting technologies (radio and television) and telephony (Khan, Hasan & Clement, 2012). In this research, ICT is used interchangeably with Information Technology (IT), a term used around the world.

ICT for teaching: ICT for teaching are "those technologies that support the teacher in their teaching of students. This could include a teacher computer (laptop, desktop or other device) that can be connected to a data projector and sound system to provide rich media to the entire class" (Douglas, 2011, p.128).

ICT for learning: ICT for learning is focused upon the needs of the student to continue their learning and as such this ICT need not only to suit the learner but also to be available to the learner when they require it" (Douglas, 2011, p.129).

Central University: In this research study central university means a higher education institution established, funded and regulated by the Government of India through UGC.

State University: State university means a higher education institution established by a State Legislation Act and funded and regulated by the particular state with some amount of assistance also from UGC. The final authority for all academic regulations is of course the UGC.

1.11 Chapter Summary

This chapter has presented the background to the subject of this research, problem statement and research questions. It outlined the research objectives, research significance of ICT utilization in the context of higher educational institutions in Assam. The chapter concluded with the structure of the remaining chapters and definitions of key terms. The next chapter focuses on a literature review of the areas that are relevant to this study.

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