

**CHAPTER- II**  
**REVIEW OF LITERATURE**

## **2.1 Introduction**

The review of literature is a written summary of the recognized facts and documents that describe the past and current status of information on the topic of the research (Creswell, 2012) or in an academic literature about a given arena. According to him, most referenced sources in any work like books, articles, journals, dissertations or thesis are acknowledged in the review of literature.

Review of related literature is an essential and significant aspect of a research process. It is stepwise process that can help the researcher in different ways. According Mertens, (2003) a review of literature follow steps and serves us to:

- a) Identify a research topic,
- b) Get an overview of the topic under discussion,
- c) Gain a conceptual framework and to formulate research,
- d) Develop a search strategy and use appropriate preliminary sources,
- e) Synthesize, compare and contrast findings,
- f) Source of data collection tools, hypotheses testing and analysis approaches and write up procedures, reference styles or both,

## **2.2. Information and Communication Technology (ICT)**

ICT is a power that has changed many aspects of our life. As stated in Burton (1999), it is a varied assembly of technological equipment and resources that are important for communication. These are sets of technological tools and resources used to communicate and to create, disseminate, store and manage information. Similarly, it has been viewed as a whole range of new technology, from radio, television, cell phones and computers to network software / hardware, as well as satellite systems and their applications, services associated with them fall under the purview of ICT (Bandeke, 2006).

## **2.3 Role and importance of ICT in Higher Education**

In the view of ICT's role in education, many educators, students, and employers intuitively felt that the integration of the computer into TLP would enhance learning (Alavi, 1994). This would boost the student's ability to apply knowledge and skills to

future problem-solving situations. Similarly Hawkins, (2002) stressed the importance of ICT as it is a factor for motivation of students and energizer for classrooms and it also “empowers girls”. This scholar resonated the need for the development of computer laboratory in higher education institutions (HEIs) in developing countries as it may take time and money, but it works well in improving access and usage. He reiterated the need for technical support that should not be overlooked.

UNESCO (1998) has observed the rapid breakthrough in the emerging ICT facilities that would drastically change the way knowledge is developed, acquired and delivered. It was also important to note that the new technologies have offered opportunities to innovate on course contents and teaching methods and to widen access to higher learning. Similarly, Roswell, (1999) reported that ICT can enhance higher education in a number of ways. It can enable the effective storing / sorting of information, and offered new and fast ways of communication; the reduction of information quantity towards a higher quality and better structure; and integrated into teaching and learning strategies and used to support relative learning theories.

Bowen and William, (2000) observed that many barriers created by distance, time zones, and the need to work directly with physical objects were overcome, and there was much more to come as new technologies emerged and the costs of hardware, software, and connectivity continued to fall. A practical example of this may be research – which was essentially one of the leading higher education functions and which benefitted enormously from e-journals archiving whose access confronted distance, time, and space. The facility further capacitated the library administration as manual service provisions were reduced, and enhanced distant learning.

Organizational adoption and assimilation of technological innovations can be fully understood when an organizational, managerial and an individual perspective is combined in a study of the change processes (Gallivan, 2001). In this view, the three main actions or procedures that need rigorous attention are selection and adaptation of the technology and change of the TLP which are interrelated and are not to be regarded as disconnected steps

following each other in a separate order. Though there is general perspective of moving towards a change of practice among teachers, there seems to be enthusiastically shifted between thoughts concerning selection of ICT, adaptation of ICT and change of practice with ICT throughout the implementation process. Each of the three actions has been analyzed using the basic structure of an activity as a framework.

David (2002) has also argued on the importance and role of ICT that computers enhanced TLP is providing opportunities for presentation, practice and analysis, and more access to source material via Internet. If computers and Internet connectivity is available, ICT was found to enhance communication and interaction between colleagues, within faculties, between classmates, and between faculties and students.

A study done by Collis & Wende, (2002) on the use of ICT in higher education indicated that higher education in general were changing from a period of habitually bottom-up experimentation to institution-wide encouragement of the use of ICT. In the study it has been indicated about the level or three-stage model which are enumerated as -

1. Institution-wide ICT implementation, i.e. the establishment of institution-wide technological infrastructure was in place,
2. Pedagogical use of this infrastructure was still in development,
3. Strategic use of ICT with a view to the different target groups of higher education was not considered explicitly yet,

Furthermore, the study has come with reasons for this low level of diffusion and integration of new technologies. As a result, the need for an institutional e-strategy was moved into the attention of current discussion on e-learning in the higher education sector - a strategy to integrate ICT in a sustainable way into the work structure of the universities. The strategic use of ICT in the TLP, as one core task of universities requires commitment, decision and explicit reflection at the institutional policy and strategic level. But the strategic decisions related to ICT use also may face some serious obstacles. In organizational theory, quite some attention was devoted to “the university” as a complex organization and significant concepts and behaviour patterns, such as, “loosely-coupled systems”, “garbage-can decision making” and even “organizational anarchy” indicated the

structural weaknesses of universities (Birnbaum, 2000; Enders, 2003; Pellert, 1999). Nevertheless, it seemed that in a broader sense, the topic of e-learning, the quality aspects of teaching and learning are currently the core priorities of much of the university leadership in higher education.

The study of Cairncross & Pöysti, (2003) on ICTs for education and building human capital found that universities are grouped into three broad categories based on their development as follows ---

1. **Universities in developed countries:** many conventional universities in rich countries used computers in the ways that schools do - as a teaching tool or to improve the efficiency of communicating with students and of administration.
2. **Universities in developing countries:** for developing countries, one of the most important uses of ICTs in universities was one that also applied in schools: as an inexpensive way to gain access to teaching materials which were expensive to create.
3. **Universities in rich countries:** in rich countries, ICTs were now widely used in university classrooms. This is true in USA where, university students frequently had access to computers in classrooms.

On the use of ICT, Derek (2004) found that when used appropriately, ICT like internet can help in uniting people and create powerful and synergistic partnerships at local, regional and global scales. The use of internet has enabled the development of various forms of virtual universities within and among countries across the globe. The point here was that as a communication medium that cannot be restricted by time and space, internet was empowering new local and global educational synergies on teaching and learning for heightened higher education to boundless viewers, beyond time and distance boundaries.

#### **2.4 Use of ICT in the teaching-learning process (TLP)**

Technology has been used as a double-edged sword. As Burbules & Callister, (2000) point out that technology can be used well or poorly and that they have advantages and limitations, the key issue concerning technology use is how it is used, by whom, and for

what purposes.

The practical use of ICT is now becoming the most important tool of the TLP in higher education, even now becoming dependent on it as well because of its versatile advantages. Bates, (1991) had highlighted that there are two very different types of interactivity in learning - social and individual.

Social interaction between learners and teachers need to be balanced with the individual student's interaction with teaching learning resources, including textbooks, study guides, audiotapes, videotapes and computer-assisted learning programmes. Furthermore, Bates, (1991) argued that students in conventional institutions or distance learning are engaged for the greater part of their time in meaningful ICT support where face-to-face interaction is a myth. And that "for both conventional and distance education students, by far the largest part of their studying is done alone, interacting with textbooks and other learning media like ICT.

Sambrook Sally, (2001) reviewed the use of ICT in line with the concepts of lifelong learning, work-related learning and electronic learning. Learning could also be enhanced by ICT including new educational and training technologies. Accordingly, the benefits of ICT have been listed out as greater access, reduced contact time between trainer and learner and reduced time spent off the job.

According to the findings of Haddad, Wadi D., & Alexandra Drexler, (2002) from the learners' perspective, the most significant factor influencing attitudes to electronic learning was user friendliness. Thus, they identified that at least five levels of technology are in use in education - presentation, demonstration, drill and practice, interaction, and collaboration. These are not exclusive categorization but there is inclusiveness, like each of the different ICT - print, audio / video cassettes, radio and TV broadcasts, computers or the internet - may be used for presentation and demonstration, the most basic of the five levels. Except for video technologies, drill and practice may likewise be performed using the whole range of technologies.

On the other hand, networked computers and the internet are the ICTs that enable interactive and collaborative learning best; their full potential as educational tools will

remain unrealized if they are used merely for presentation or demonstration.

Nyvang Tom, (2003) has done a substantial study on the use of ICT in higher education. The findings revealed that implementation of ICT in higher education learning environments were a complex task as teachers, students, management, administration and ICT support were affected by the implementation of ICT. To facilitate the study of the changing processes, the first step is to understand what problems and challenges implementation of ICT will lead to and how it affects practices of the HEIs and their communities. The study focused on teachers and from that perspective of the implementation of ICT, three interrelated processes were identified as selection and adaptation of ICT and change of practice with ICT. Each process will present its own merits, goals and demerits and challenges. With the motivation for implementation of ICT by the teachers, it was expected to improve the quality in student learning based on a social constructivist understanding of learning.

Technology can enhance the teacher-student experience, Joseph, (2012) in his study concluded that the educator-student learning experience can't be replaced by technology due to human and social elements which technology lacks. Educational technology does not have interpersonal interaction and an increase in technology can lead to less interaction within teacher-student interactions. Communication happens about 80% through language, while 20% is nonverbal such as writing. Educational technology falls into the 20 percent category concluding that it is not the best of tools.

There are objectively too much advertisement about web-based learning (Muse, 2003), however less was said of technical difficulties or ICT illiteracies that students and teachers are facing and eventually high levels of technically motivated dropouts. The researcher assessed a number of students who dropped out of web-based courses; and found that most students could not obtain, access, or install all the required learning materials in a timely manner due to ICT illiteracy constrains and had to drop the course while they still had a chance to do so.

Pittinsky, (2003) reported that some of the studies may be rapid due to political, socio-economic and technological changes because of many internal and external pressures on universities created to look at teaching and learning patterns and practices. This may be from a new perspective of meeting the challenges created by knowledge-based societies. These pressures included ---

- course content requirements (Bates, 2004),
- a demand for a greater number of higher education places but no corresponding increase in funding (Phillips, 2005),
- technology opportunities and the drive to use ICTs in teaching and learning (Allen & Seaman, 2004; Challis, Holt, & Rice, 2005),
- a larger "clientele" of learners from varied backgrounds, with diverse needs, motivations, abilities, learning preferences, time availability and a demand for more client-responsive and flexible courses (Ryan & Stedman, 2002; McInnis & Hartley, 2003) and
- the need to seek alternatives to government funding (Higher Education Funding Council of England [HEFCE], 2001).

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

The study of Sheard & Lynch's (2003) on learner diversity showed that different students did experience and react to an online environment in different ways subject to their previous experience and that no single format met needs of all students. Consequently, encounters for online learning were students' unfamiliarity with the learning environment and their skills and confidence with the internet and information technology. However, using a web forum could encourage dialogue among students as well as between students and teachers and thus could enhance learning within a safe environment (Soest, Canon, &



Grant, 2000).

Sometimes, the quality of experiences for students and faculty may be affected by the designing of the technology infrastructure for HEIs which is a strategic decision (Erickson & Wilding, 2004). In their study on students' reactions to a campus wide laptop computer initiative, it was found that the laptop computer was an indispensable part of college learning for students (i.e., for typing papers, accessing the internet, searching for research references, making Power Point presentations, and storing information, making a significant difference in students' study habits as well as their academic and social lives. In other words, the laptop computer extremely helped college students with classroom assignments, e-mail message, and individual research or projects for the course. The study also found that student perceptions of the value of the laptop computer to their academic success were positively correlated with their perceptions of the success of faculty in integrating the laptop computer into classroom activities.

However, the strength of student frustration about the cost structure of the laptop usage was one of the most striking findings. This is very critical for online distance learners as they are learning independently. Online distance learning provided answers to the problems of availability (such as accessibility and cost) and the demand for flexibility (such as time, place and pace) of higher learning and technology-mediated learning and online distance education were becoming major vehicles for fulfilling the needs of lifelong learning (Beller, 1998). Yet, a review of papers which purported to study students' experiences and use of technologies (Sharpe et. al., 2005) found that many of these studies focused primarily at the level of course evaluations, rather than on how learners actually use and experience technology. The authors argued that we are failing to adequately acknowledge the learner perspective in the development of tools, pedagogy and teaching practices. They suggested that more in-depth studies were needed that captured the diversity of how students are using technologies in their formal studies as well as eliciting students' perceptions of technologies.

In relation to experiences with technological facilities, Demb et al., (2004) emphasized

that gaining sufficient experience with a new computer system to achieve “teaching fluency” required a substantial investment of time and attention on the part of the instructor. This also goes with the students since they are coming from different backgrounds so that they will be able to determine the use of ICT for their purpose of taxonomies. Levin & Bruce's, (2001) taxonomy of educational technology categorizes students' technology use of learning into four categories -

- \* technology as media for inquiry,
- \* technology as media for communication,
- \* technology as media for construction, and,
- \* technology as media for expression.

Each technology is likely to play a different role in students' learning. Students can learn "from" computers - where technology is used essentially as a tutor and serves to increase student's basic skills and knowledge. And students can learn "with" computers - where technology is used as a tool that can be applied to a variety of goals in the learning process and can serve as a resource to help develop higher order thinking, creativity and research skills.

Bob Fox, (2007) conducted a study on teaching through technology in which he scrutinized the use of ICT in teaching and learning contexts in two universities in two countries and focused on teaching staff perceptions about how ICTs provided benefit to learning and teaching. The study raised a number of issues that needed to be addressed before such technologies could be successfully integrated into sustainable and transferable mainstream TLP.

Further, the pressure on higher education from outside as well as inside to incorporate ICT would continue to grow. Society expected graduates to emerge from their university experience with appropriate technology skills and abilities irrespective of the relevance of such technology to individual disciplines.

While change in higher education advanced by technology is a safe stake for the future, it

is equally certain that technology adoption will proceed unevenly across the higher education landscape and be driven by a wide range of factors. Shifting demographics, market, political and other forces will require many colleges and universities to redefine their institutional cultures and missions. At the same time, socio-economic realities and security-related disruptions will constrain the transformational potential of information technology. Henshaw, (2008) has said that some factors will limit the extent of innovative technology adoption while others will spur the transformation of teaching and learning.

Universities need to consider technology-based instructional programmes that are created to ensure students' effective use of internet as a learning tool. Gudanescu, (2010) suggests tools of education similar to Bruce and Levin's categories.

The Internet can provide the following three basic types of tools in the educational domain --- Tools for inquiry, communication and construction.

Rowe, (1993) made the point that obviously, the more effective use of computers in education would require new patterns of interaction between students and teachers, changes in the social organization of the classroom, the adaptation of curricula and alternative purposes and modes of student evaluation. The use of computers can also cause a change in the roles of teachers and students. Computers cannot easily be integrated into classrooms to create supported learning environments without a better understanding of the interaction between teachers and students or between students and their classmates (Olson, 1992). For faculty members, there must be opportunities for concrete experiences capable of generating a personal conviction that a given technology is worth using and an understanding of the contexts in which it is best used (Kukulka et. al., 2012).

#### **2.4.1 Role of Teachers**

The functions of teaching are considered paramount especially when we consider the TLP as the acquisition of knowledge and skills by individuals to enable them to become useful members of the society. Taylor et. al., (2010) highlighted how in a decade the use of computers as a teaching and learning tool has undergone rapid changes. From being

initially used by teachers to prepare or store lecture notes, create databases for examination questions or keep up with administrative matters, the development of personal computers has grown leaps and bounds.

Teachers do not yet exploit the creative potential of ICT to the forefront and engage students more actively in the production of knowledge. Teachers' use of ICT for communication with and between pupils is still in its infancy. ICT is under exploited to create learning environments where students are more actively engaged in the creation of knowledge rather than just being passive consumers (Blamire, 2006).

The role of the teacher shall remain critical in that students will continue to need guidance and assessment from skilled teachers. However, what constitutes that role is headed towards a requirement of a greater range of disciplines, skills and understanding as well as the ability to direct students through large quantities of rich information. High levels of computer support encourage teachers to use more collaborative group activity and fewer stands up lecturing.

Initially, academics only used a fraction of the modern PC's capacity but today we have the option of sending and receiving high-quality sound, pictures, diagrams, animations and text. The most important entity in determining a classroom environment are the teachers. In most classrooms it is the teacher who decides what content is important, directs and assesses student-learning, structures the environment, chooses and provides the materials to be used. Typically, the teacher and other components of the education system determine what is to be taught and learned.

The teacher will always have a role in directing what and how students learn whether this is by controlling the instruction or providing the learning situations. Predominantly computer use involves computers being used by students. Therefore, as indicated earlier, this necessitates a more student-centric approach. A teacher-centric approach could still be adopted through use of selected demonstration and tutorial applications. The teacher needs to become a catalyst for learning rather than being the focus.

The teacher becomes a learning model for the students, not an expert in everything. The teacher is a facilitator of cooperative learning by involving students in real problem solving. In the apprenticeship model, the teacher may use ICT to model an activity and then scaffold the learner as mentioned in Committee on Developments in the Science of Learning (CDSL, 2000).

The teacher needs to play the role of guiding students' interpretation of experiences to make them meaningful. This role mandates the development of skills to initiate, organize and evaluate change while recognizing constructive criticism against indiscriminate computer use.

Keeping short term and long term goals in mind, they need to determine appropriate situations for computer use. Such long-term goals would include turning students into independent learners that use computers for the development of higher learning skills. For the teacher there is a risk of losing one's established influence over the values and directions of classroom activity. Therefore the potential of computers disturbs some teachers who are concerned about their own role and influence in the classroom. To help teachers avoid developing a resistance based on this conception it is important that they be encouraged to reflect on the impact on their role and on that of the students. Initially this calls on teachers to reflect on current practices and beliefs, which may be difficult particularly if they are not encouraged by their education system. After considering the wider issues, teachers then need to think about how they exert influence in their classrooms. This may make them consider changes in their teaching practices to incorporate computer use more readily into their classrooms.

According to Blamire, (2006), there is a need to motivate and reward teachers to use ICTs. Policies in this area should include measures raising the confidence levels of teachers but also by means of providing incentives, recognizing and rewarding the use of ICT.

As stated by Linn & His, (2000), there are lists of pragmatic pedagogical principles that teachers should consider while they are teaching with the help of ICT ---

- Encourage students to build on their scientific ideas as they develop more and more powerful and useful pragmatic scientific principles,
- Encourage pupils to investigate personally relevant problems and revisit their scientific ideas regularly,
- Scaffold science activities so pupils participate in the enquiry process,
- Model the scientific process of considering alternative explanations and diagnosing mistakes,
- Scaffold pupils' feedback to explain their ideas,
- Provide multiple visual representations from varied media,
- Encourage pupils to listen and learn from each other,
- Design social activities to promote productive and respectful interactions,
- Scaffold groups to design criteria and standards,
- Employ multiple social activity structures,
- Engage pupils in reflecting on their scientific ideas and on their own progress in understanding science,
- Engage pupils as critics of diverse scientific information,
- Engage pupils in varied sustained scientific project experiences,
- Establish an enquiry process which can be generalized and is suitable for diverse scientific projects.

#### **2.4.2 Students and Learning in ICT**

The role of the students in computer-based learning is just as fundamentally significant as the teacher's role. In order for learning environments to become more student-centric, the necessary shift in responsibilities from teacher to student requires students to become more self-directed and motivated. Though, that is not to say that the teacher would bear no responsibility. According to CDSL, (2000), the students will always play both passive and active roles in the teaching and learning scenarios. It is suggested that the balance of control and roles is likely to shift towards student participation with the use of ICT to support learning processes. This transfer of roles or control often occurs spontaneously and naturally in a classroom within an activity.

Innovations involving the use of computers always place extra efforts on students. For the students it may represent a new method for learning in which they have to develop confidence and competence. This may require them to develop skills concerned with taking more responsibility for learning and relying less on the teacher. They may need to develop skills in making decisions for themselves and with other students. In addition, practical skills such as the ability to follow instructions presented on paper, by a teacher or on a computer screen need to be developed.

Students will also need to develop skills in determining and assessing their own learning. For example, self-directed learning using computers usually implies the use of more visual forms of instruction and information than verbal. Therefore students need to have increased levels of comprehension and concentration. Students need to develop skills in recording and evaluating their findings and progress. With the help of the teacher they need to be able to interpret their findings and make decisions about directions for learning. The students' focus should be on the problem, concept or task, not on the use of the computer.

Social networks were established initially for creating a circle of acquaintances for people with similar fields of interest. Facebook for example, was established to help higher education students identify their fellow students from other institutions (Kirschner & Karpinski, 2010). The ubiquity of social media (e.g., Facebook, Twitter) is no more apparent than at the university. Social media are increasingly visible in higher education settings as instructors look to technology to mediate and enhance their instruction as well as promote active learning for students.

Since the students play the dominant role they need to develop a strong sense of responsibility for their own learning and develop skills associated with the management of time, concentration, self-discipline, attention to task and ability to follow instructions. They need to develop skills in reflecting on learning experiences and selecting and using learning strategies.

### **2.4.3 Use of ICT in Pedagogy**

According to Cording to Cox et. al., (2004), teachers' pedagogies and pedagogical reasoning highly affect their use of ICT and thereby students' achievement. They opine that the way ICT is used in lessons is influenced by the teachers' knowledge about their subject and how ICT is related to it. Some teachers choose ICT resources that relate to a particular topic. Some others use it to present the pupils' work in an innovative way, without any direct application to the topic. In this view, when teachers use their knowledge of both the subject and the way students understood the subject, their use of ICT has a more direct effect on students' achievements. The effect on achievement is the greatest when students are challenged to think and to question their own understanding, either through students using topic-focused software on their own or in pairs, or through a whole-class presentation.

Successful integration of ICT is becoming an essential competency for educators and learners (Wang, 2008). In the same way, Selwyn, (2007) has argued the potential of computer technologies to revolutionize the TLP in higher education and teachers must be aware of the technology in order to adopt new roles and support students' learning (Somekh, 2008). ICT plays the role of an agent or a catalyst for pedagogical change (Czerniewicz et. al., 2007).

According to Watkins & Mortimore (1999) cited in Loveless (2010), pedagogy is defined as any conscious activity by one person designed to enhance learning in another. Design for learning encapsulates contemporary understandings of teaching which focus on a 'systematic approach with rules based on evidence and a set of contextualized practices that are constantly adapting to circumstances' (Beetham & Sharpe, 2007; cited in Loveless, 2010). Good pedagogical design needs to express the congruence between the content, teaching strategies, learning environment, assessment and feedback and all of these reflect underlying theories of learning and value (Mayes & de Freitas, 2007). Wang, (2008) also defined pedagogy as "the teaching strategies, techniques or approaches that teachers use to deliver instruction or facilitate learning" (p.412). The scholar (2008)



explained that pedagogy, social interaction and technology are three components of a technology-favored learning environment and a coherent design is necessary to allow teachers to integrate ICT into teaching. These studies indicated that pedagogical issues are vital ingredients in ICT integration into higher education.

The question of how we can develop our understanding of the contribution and constraints that ICT tools and resources might bring in, an approach to pedagogy in a constructive, interactive and complex way is the main question where researchers are worried about. Loveless, (2010) considered different elements in teachers' pedagogical reasoning with ICT that includes ---

**a) The Wider Contexts for ICT in Education**

This revolves around the issues of economic, social and cultural contexts which influences educational policy and the provision of ICT resources for learning and teaching. The question 'Why use ICT?' can be viewed at different levels in the economy, in society and in education. The wider social, economic and policy context of ICT has an influence on strategies and resourcing for education, from the provision of ICT equipment in schools and designing schools for the future, to commissioning research in technology enhanced learning process. Loveless, (2010) extended his view that ICT might be important in work for three different reasons, which themselves can be in tension.

**b) Metaphors for ICT and Pedagogy**

This is the view of Loveless, (2010) on the metaphors that have been used to describe the roles of ICT in pedagogical designs and activities as they offer insights into how teachers and software designers understand the relationship between learners, teachers, knowledge and digital technologies. Thus, the four common metaphors of ICT are resources, tutors, tools and environments. The metaphors demonstrate different degrees of control, motivation, access and choice for learners and teachers. The reported stress that the metaphor of 'resource' expressed the ways in which teachers had different digital technologies 'to hand' and were able to select them according to their needs. They were

often used to reproduce or imitate other resources to support familiar or common practice in a non-digital curriculum, such as interactive whiteboards for presentation.

### **c) Technological Pedagogic Content Knowledge**

This pedagogical reasoning was ignited from the view of Cox et. al., (2003) cited in Loveless, (2010) where he recognized the additional complexity in pedagogical reasoning when ICT resources are involved, whether that be as a resource, a tutor, an environment or a tool. The knowledge, skills and understanding that teachers require have long been a matter of interest and there have been studies to explore the characteristics of teachers' professional knowledge.

The interaction of all three elements gives rise to technological pedagogical content knowledge which is dependent on the understanding of the representation and formulation of concepts using technologies; pedagogical techniques that utilize technologies in constructive ways to teach content; knowledge of what makes difficult concepts easy to learn and how technology might address these issues; awareness of students' prior knowledge and theories of epistemology and an understanding of how technologies can be utilized to build on existing knowledge and to develop new ones (Loveless, 2010).

#### **2.4.4 Attitude towards use of ICT**

Governments, more specifically HEIs are investing significant funds to purchase new technologies (Gulbahar, 2007). However, successful use of ICT in the classroom setting depends on students' attitudes (Khan et. al., 2012). Learners within the learning environment take a keen interest in using new ICT technologies which allows their learning to be more effective (Flecknoe, 2002).

In an investigation by Kaur, (2012) on the - attitude of students towards use of ICT in higher education, it was revealed that Indian students have shown high and positive attitude towards use of ICT. Thus, he recommended that more and more new technologies must be used in higher education and it can automatically help in national development. In this regard, course design, learner motivation, time management and

comfort with online technologies are listed as factors that can affect the success of an online learning experience. Flexibility in study time, technical capacity building to make them comfortable with web-based environments, interaction between students and teachers were seen as key factors in students' sense of community. However, the report examined the worldwide need felt for integrating ICT into education in order to improve the pedagogy to reflect the societal change.

A study undertaken by Coffin & MacIntyre, (1999) revealed that as "... students gain more experience with computers, their attitudes towards computers should become more positive" (p.555). As noted by Tinio, (2000), internet connectivity can increase learner motivation because it creates interactivity with other ICTs which facilitates connecting with people and collaborating in real world events.

ICTs such as videos and interactive multimedia can be used to engage the student in the learning process (Tinio, 2000). Generally, students use ICT for many different purposes: writing, e-mailing, internet browsing, playing games and chatting (Erstad, 2003). When ICT is used, students are more motivated to learn (Demiraslan & Usluel, 2008; Erstad, 2003; Ilomaki & Rantanen, 2007) and develop skills and increase their ability to learn (Flecknoe, 2002). Plumm, (2008) argued that students tend to have positive perceptions about using technology in the classroom.

A study carried out by Demiraslan & Usluel, (2008) confirmed that the use of ICT motivates students. This point was strongly emphasized by Kington et. al., (2002) study which stated: "... the use of ICT by students for the production of their work motivated them to complete work and to redraft work to reach the required standard" (p.33). Podmore, (1991) had a similar view and pointed out that "... computers are generally motivating and have holding power for children" (p.87). Schofield, (1997) strongly argued that the huge body of research and experiments suggests that the use of ICT does motivate students and increases mental challenge, control and curiosity. There are issues in terms of attitudes towards technology as rightly pointed out by Kington et. al., (2002), in that some students do not use computers.

Solvberg's, (2003) longitudinal study found that students' inherent motivation when using ICT was high with no evidence of the novelty factor effect (see Coffin & MacIntyre, 1999). McKinnon et. al., (2000), in their study found that an experimental group of students became enthusiastic when using computers and performed remarkably better than a non-experimental group of students. ICT does promote academic achievements, but the impact depends on how ICT is used (Saunders & Klemming, 2003) and pleasurable and enjoyable learning activities (Podmore, 1991).

## **2.5 NET Generation**

The Net Generation is the group of young people born and had grown up surrounded by an environment in which they are constantly exposed to digital media (Jones, 2011). These are groups who are exposed to ICT which is getting different names and it is also proposing different names for the generation who is using the technological devices. The digital era, millennial, electronic natives and the net generation are some of the many names that have been used to describe the new generation of students. Any child born since the beginning of this century is growing up in a digital world (Prensky, 2001) which are known as the digital natives. These are students fundamentally different from previous generations in the way they process information and communicate (Oblinger, 2005). Oblinger, (2005). This scholar has also described the characteristics of the millennial students as these are students. However, (Jones, 2011) explained that there is no evidence that there is a single new generation of young students entering higher education and the terms net generation and digital native do not capture the processes of change that are taking place. Overall, Price, (2005) clarified that the technology is fundamentally impacting the ways in which students learn, but that more in-depth research is needed to understand the degrees of how net generation is using technologies to support their learning.

Students in the 21<sup>st</sup> century are ultimately the main beneficiaries of ICT and demand that universities modernize their systems and teaching practices to keep up with workplace requirements. The key features of ICT in learning: anywhere, anytime mode of learning and the networked communities harmonize very well with net generation or young

peoples' lifestyles and the communication media of their time and age.

Although ICT has numerous benefits, several research studies are critical of its usage in universities. For this, e-learning courses that are developed need to be designed to match the learning styles and needs of the net generation as the complex changes that are taking place in the student body have an age-related component. This is the most obvious with the newest waves of technology like social networking sites (e.g. Facebook), uploading and manipulation of multimedia (e.g. YouTube) and the use of handheld devices to access the mobile Internet (Jones, 2011).

ICT boosts the TLP specially the communication between teachers and students and enables the 'anywhere and anytime' learning for the net generation. But a study on students and university teachers, querying who mutually benefit from the Internet communication in the learning process, points to lack of a generally acceptable level of internet communication. It indicates that while students complain about the long response time of teachers to e-mails as well as the reluctance of university teachers to participate in online communication. University teachers criticize the quality of the Internet communication. Students' demands are not declared clearly enough. Both educators and students need to be trained to use ICT to increase the overall quality of education and the effectiveness of the communication (Zelenakova et. al., 2012).

## **2.6 Global Trends in Educational ICT Practices**

There are different developmental trends in ICT especially in higher education. This is because of the link between education in universities and knowledge management (Dalrymple & Harvey, 2002). This again assumes the view that quality in higher education is about producing competent students and the need for quality of teaching learning in higher education that should offer students with a transformative learning experience. Nelson, (2002) observed that universities would fulfill significant functions of the society. They value learning throughout life and promote the pursuit, preservation and transmission of knowledge. Universities are expected to fulfill significant functions with regard to economy, society, environment and culture. With rapid changes and

development in every aspect of the world in recent years, most universities profess a commitment to change and are confronted with formidable challenges. These include globalization and the convergence of ICT, diversification of funding sources of higher education and social and environmental issues.

ICT supported the perpetuation of globalization and breaks the boundaries of nationhood, geography, ethnicity and culture. It can help universities to have the opportunity to develop in global markets and join the word-wide communities.

A major challenge to universities was the emergence and growth of knowledge based economy and society, in which technological and scientific developments play a key role. ICT networks, international competition and knowledge-intensive products and services dominate economic activities (Berjerse, 2000 cited in F. Zhao, 2003). Knowledge is replacing the infrastructure and networks are replacing hierarchies in society (McShane & von Glinow, 2000). Therefore, a significant goal of universities is the development of students as competent knowledge workers.

The survey report of Robin Middlehurst, (2003) depicted that ---

- Increasing faith in the power of technology was seen as enormously increasing the use
- of ICT in education institutions worldwide,
- This trend led to the emergence of a number of non-traditional higher education service providers – competing for the student population among themselves and with the traditional university,
- The traditional university no longer had hegemony over the provision of higher education,

In rising to the new challenge, it was turning to ICT to improve the quality of its operations and also to reach for students in destinations beyond the traditional physical boundaries. But the increasing use of ICT in HEIs was set within a context of wider economic, social and political changes affecting countries worldwide. As a result, the rationales and choices made by institutions for their ICT applications influenced by a variety of macro and micro environments and consequent perceptions of competition and

the need for collaboration. Issues such as the digital divides, literacy limitations, financial constraints (largely developing countries), changes (increases) in student enrolment numbers (which was a global phenomenon), global technological developments and competition between and among the HEIs and the emergent providers of higher education (global phenomena) were examples of the forces that drive change contexts.

## **2.7 ICT in Indian Education**

In India and the world in general, there are so many barriers that confront the students in pursuing their higher education, which may include cultural, economic and geographical barriers for the people who wish to pursue higher education (Bhattacharya & Sharma, 2007). This will affect the use of ICT in the education system as well. In developing countries like India, effective use of ICT for the purpose of education has the potential to bridge the digital divide and reach disadvantaged groups. ICT-enabled education will ultimately lead to the democratization of education. It also facilitates sharing of best practices and knowledge from across the world.

For the past few years India is making use of a powerful combination of ICTs such as open source software, satellite technology, local language interfaces, easy to use human-computer interfaces, digital libraries, etc. with a long-term plan to reach the remotest of the villages. Community Service Centers (CSCs) have been started to promote e-learning throughout the country (Bhattacharya & Sharma, 2007).

Government is a key catalyst for increased IT adoption in higher education through various reforms that encourage IT acceptance. Important developments especially for engineering education include the National Programme on Technology Enhanced Learning (NPTEL), the use of an educational satellite EDUSAT and various other approaches such as the use of 'virtual classrooms and laboratories'. NPTEL is an open courseware initiative based on a similar programme of Ministry of Information Technology, Government of India that uses Internet and television technologies to telecast video-based educational content. There are notable initiatives of use of ICT in education

in India. The Eklavya initiative uses Internet and television to promote distance learning while Indira Gandhi National Open University (IGNOU) uses radio, television, and internet technologies. IIT-Kanpur has developed Brihaspati, an open source e-learning platform while premier institutions like IIM-Calcutta have entered into a strategic alliance with NIIT for providing programmes through virtual classrooms.

Learning and dissemination of information is becoming more important than ever. Internet-based education and e-learning are the trends of the day. Looking at India's attempts to harness the broadcast technologies, one comes across a kaleidoscope of activities. India is the only country with a satellite completely dedicated to education, the EDUSAT (Sivakumar, 2008).

India has developed educational broadcast channels such as the Gyan Darshan Network and dedicated satellites such as EDUSAT for audio, video and data transmission and interactivity. The University Grants Commission (UGC) has launched a mega project of interlinking universities and colleges in the country electronically with a view to achieving maximum efficiency through internet-enabled teaching, learning and governance.

For developing e-content, UGC has launched a scheme for teachers. Consortium for Educational Communication (CEC), which is to provide training to teachers in e-content development, is also working towards preparing media centers to help teachers to develop programmes. This will greatly strengthen Indian higher education system. CEC telecasts the programmes for students and teachers. Each module has programmes on a particular subject.

## **2.8 Factors affecting implementation of ICT in universities**

ICT has now become more practical and applicable in two basic and broad areas in the higher education system.

The first area where it is serving in HEIs is its use in creating uniform administrative systems and interfaces, like online admission forms, status tracking, availability of results, course schedule etc. In some cases, depending on the faculty members, online submissions



of assignments are also being done.

The second application is on the academic areas where the flexibility offered by online courses that having brought in a new range of students, in terms of social and professional backgrounds. This is the potential area for the masses that do not have time and money to go to HEIs but any grand plans for this depend heavily on reliable high-speed Internet coverage.

There are several factors that can affect the effective and successful utilization of ICT in HEIs. These may include the presence of physical infrastructure and appropriate curriculum. Besides, these, there shall be content and technical support like training programmes. The facilities needed like hardware; software and human resources must be appropriately maintained through centralized and on-site technical support and supervision. There are several factors that affect adoption of ICT in education, namely the access, knowledge, attitude and practice. The management system of the institutes must be aligned and implemented for the ready purpose of exchange of information for planning.

Beyond the physical factors for ICT, there are attitudinal factors that can deter its use in education which have to be addressed through proper strategies. These may include resistance of the HEIs which can emanate from a limited vision of the future, comfort with the way things are, deficits in information and communication, the individual's nature to be non-cooperative and a lack of skills (Moerschell, 2009). According to Peeraer & Petegem, (2009) the factors explaining the integration of ICT in teaching practice are ICT skills and computer confidence.

ICT may also induce a kind of digital divide within a class since our students are coming from diverse socio-economic backgrounds. Students who are more familiar with ICT will secure more benefits and learn faster than those who are not as technology-friendly. This may lead to shift of attention from the primary goal of facilitating teaching learning for content learning to developing ICT skills, which is the secondary goal. The bonding process between the teacher and the student may be affected as ICT becomes a

communication tool rather than face-to-face conversation and thus the transactional distance is increased. Teachers who are not experts with ICT may be negligent in updating the course-content online that can slow down the learning among students.

The contribution of a definite ICT device and application highly relies on the competency, motivation and confidence of the teacher to exploit the technology as per the planned usages of the system. These again depend on the training offered, nature of devices available, technical support and supervision availed.

According to Sarkar, (2012), the most common mistakes in using ICTs in the teaching-learning process are:

- i) Installing learning technology without reviewing student needs and content availability;
- ii) Imposing technological systems from the top down without involving faculty and students;
- iii) Using inappropriate content from other regions of the world without customizing it appropriately; and
- iv) Producing low quality content that has poor instructional design and is not adapted to the technology in use

According to him, the costs of hardware and software can also be one of the restraining factors for the use of ICT that is requiring high cost of purchasing, installing, operating, maintaining and replacing the device. According to Blamire, (2006), in some countries it is the educational system itself and its rigid assessment structures that impede the integration of ICT into everyday learning activities. Although many tools exist to help teachers and students locate information at present, a lack of commonly held technical standards inhibits sharing educational resources across institutions and between wide ranges of technical environments. This presents a significant obstacle to realizing the educational potential of ICT.

The most critical challenge, is prevailing in many colleges and universities, specially in developing countries, is 'power supply'. Electricity is the basic requirement for running ICT facilities since electric power supplies run almost all of them. Besides this, absence of

ICT skills is challenging the online learners specially as all the students and faculty members are not ICT literate and cannot teach using ICT tools. It needs all of the participants to be ICT literate and therefore they need to be well equipped in their ICT skills. The fear that exists among teachers that ICT may replace them eventually should be discarded.

## **2.9 Impact of ICT on higher education**

Theoretical and logical analysis may be put forward in providing strong justifications about the importance of ICT in higher education. However, it is empirical to support the rational with practically demonstrated experiences. For this, a survey was conducted in higher education of India in 2013 (Lal & Paul, 2013). Based on this, the findings suggested that the technological and physical infrastructure in rural areas was still a major hindrance in capitalizing benefits of ICT revolution. The study found evidence to suggest that faculty also needs to be motivated to use more modern and effective ICT-led teaching tools.

Some researchers are against the study on the impact of ICT on higher education. Salomon, (1994) put his stand as there is little purpose in attempting to compare the academic outcomes when using computers with using a textbook or some other resources and argues that it is not possible to study the impact of ICT use in the absence of the other factors or to assume that ICT impacts outcomes independently of the outcome. However, other researchers are still pursuing their studies to find out differences that have come due to the utilization of ICT. Accordingly, Becta, (2002), in his study show that there is no direct link between using ICT and student learning based on the weight of evidence now clearly shows that indirectly there can be a significant positive impact.

The impact of ICT utilization on students' learning depends on their specific uses. Ben & Ph, (2008) argued that ICT-based instruction could restrict the creativity of the learner and tends to allow acting only in a pre-defined way with limited interactive possibilities. This might reduce the students' abilities in terms of problem-solving and creative thinking in pre-determined schemes but not their ability to come up with independent creative

solutions on their own.

Glenda Gay et. al., (2006) have forwarded that the most reputable educational researchers today would agree that there would never be a direct link because learning is mediated through the learning environment and ICT is only one element of that environment. Studies that have tried to identify this mediated impact of ICT on learning have found it impossible to entirely remove the effects of other elements of the learning environment.

Similarly, Lei, (2007) had studied the impact of the ICT on student learning outcomes. Based on the findings, on an average students spent about three hours per day on computers and the amount of time spent on it did have an impact on change in students' Grade Point Average (GPA) over the academic year. Thus, the study concluded that more time spent on computers, the fewer students' gain, or the more they lose in their GPA. This finding indicates that students can benefit from spending up to about three hours per day using computer technologies; however, when they spend too much time on computers, the benefit seems to be reduced or even replaced with a deficit.

A study done in the United States of America found a significant, positive impact of ICT on students' performance (Sosin et. al., 2004). It seems that ICT is positively correlated to performance. This was also supported by Woessman, (2004) which concluded that an appropriate use of digital technologies in higher education could have significant positive effects both on students' attitude and their achievements.

## **2.10 Gaps in Literature**

There is a lack of literature identifying the factors that affect the adoption of ICT in higher education in the context of Assam. Due to this, there is a need to undertake research about adoption of ICT in higher education in Assam. Researchers like Walsham & Sahay in their research paper emphasised the importance of academic research in developing countries, by identifying gaps in the literature in this context (Walsham & Sahay, 2006; Walsham et. al., 2007).

This research will fill the gap in the literature and address the need to develop an adoption of ICT in higher education framework suitable for Assam. This research addresses two major point is ---

- a) identification of the factors relevant to the adoption of ICT in higher education; and
- b) ways to utilize ICT within the higher education sector of Assam. Research in this area seeks to address critical gaps to gain a wider understanding of future directions.

### **2.11 Chapter Summary**

This chapter has reviewed the literature relevant to this research study. The chapter began by highlighting the two main elements of the research. These elements are ICT and higher education and different kinds of problems and prospects while implementing in the teaching-learning process.

## Reference:

Alavi, M. (1994). Computer mediated collaborative learning: an empirical evaluation. *MIS Quarterly*, 18 (2), 159-174.

Allen, E., & Seaman, J. (2004). Entering the mainstream: The quality and extent of online education in the United States, 2003 and 2004. Retrieved from [http://www.sloan-c.org/resources/entering\\_mainstream.pdf](http://www.sloan-c.org/resources/entering_mainstream.pdf)

Brown, David G. (2002). Proven Strategies for Teaching and Learning. Presentation in The New Educational Benefits of ICT in Higher Education Conference, Rotterdam, September 2, 2002; URL: [http://www.wfu.edu/~brown\\_brown@wfu.edu](http://www.wfu.edu/~brown_brown@wfu.edu)

Becta. (2002). The Impact of Information and Communication Technologies on Pupil Learning and Attainment: *ICT in Schools Research and Evaluation Series* (Vol. 7). Coventry: British Educational Communications and Technology Agency.

Becta. (2004). A review of the research literature on barriers to the uptake of ICT by teachers. Coventry: *British Educational Communications and Technology Agency*.

Ben, A. & Ph, Y. (2008). The Impact of ICT on student performance in higher education: Direct effects, indirect effects and organisational change, in Monograph, *The Economics of E-learning*, 2008.

CDSL. (2000). How people learn: brain, mind, experience, and school: Expanded Edition. (2nd ed) Washington, D.C.: *National Academies Press*. (Committee on Developments in the Science of Learning)

Cox, M., & Webb, M. (2004). A review of pedagogy related to information and communications technology. *Technology, Pedagogy and Education*, 13(3), 235-286.

- Demiraslan, Y., & Usleul, Y. K. (2008). ICT integration processes in Turkish schools: Using Activity Theory to study issues and contradictions. *Australasian Journal of Educational Technology*, 24(4), 458-474.
- Erstad, O. (2003). Electracy as empowerment: Student activities in learning environments using technology. *Young*, 11(1), 11-28.
- Flecknoe, M. (2002). ICT doing different things, rather than doing them differently, *Management in Education*. 16(1), 26-30.
- Gay Glenda. (2006). "Perceptions of information and communication technology among undergraduate management students in Barbados", *IJEDICT*, Vol. 2, Issue 4, pp. 617, 2006.
- Haddad, Wadi D. & Alexandra Drexler (2002), "The Dynamics of Technologies for Education", in Haddad, W. & Drexler, A. (eds.) *Technologies for Education: Potentials, Parameters, and Prospects* (Washington DC: Academy for Educational Development and Paris: UNESCO), p. 9.
- Henshaw, R. G. (2008). "A singular vision for a disparate future: technology adoption patterns in higher learning through 2035", *Innovate*, Vol.4, No.5, 2008.
- Mertens, D. M. (2010). *Research and evaluation in education and psychology : integrating diversity with quantitative, qualitative, and mixed methods*. 3rd ed. SAGE Publications India Pvt. Ltd.
- Nyvang, T. (2003). *Computer Support for Collaborative Learning: Implementation of ICT in higher education: A case study of teachers implementing ICT into their teaching practice*, Readings for Doctorial Consortium.  
(<http://www.intermedia.uib.no/cscl/doc/files/Nyvang.pdf>, e-mail: [nyvang@hum.auc.dk](mailto:nyvang@hum.auc.dk) accessed on 24-08-2014)

- Sambrook Sally. (2001) Developing a model of factors influencing workrelated learning: Findings from two research projects, ECER Conference, Lille, 2001, Vocational Education and Training Network (VETNET).  
<http://www2.trainingvillage.gr/download/ero/SamSa02.rtf>
- Sarkar, S.(2012). The Role of Information and Communication Technology (ICT) in Higher Education for the 21st Century. *The Science Probe* Vol. 1 No. 1 p. 30-40, ISSN: 2277 – 9566
- Schofield, J. W. (1997). Psychology: Computers and classrooms social processes - A review of the literature. *Social Science Computer Review*, 15(1), 27-39.
- Taylor, P., Christie, M. F. and Jaun, A., "Evaluating the use of ICT in Engineering Education", *European Journal of Engineering Education*, pp. 37–41, 2010.
- UNESCO. (1998): World Declaration on Higher Education For The Twenty-First Century, Vision and Action. Article 12, 9 October 1998, Paris.
- UNESCO. (1998). UNESCO Stastical year Book 1998 (Paris, UNESCO Publishing, Bernan Press)
- UNESCO. (2002). *Information and communication technology in education: A curriculum for schools and programme of teacher development*. United Nations Education, Scientific, and Cultural Organization. Paris: France: UNESCO. Retrieved from <http://unesdoc.unesco.org/images/0012/001295/129538e.pdf>
- Van Soest, D., Canon, R., & Grant, D. (2000). Using an interactive website to educate about cultural diversity and societal oppression. *Journal of Social Work Education*, 36(3), 463-479.
- Wang, Q. (2008). A generic model for guiding the integration of ICT in learning and teaching. *Innovations in Education and Teaching International*, 45(4), 411-419



Walsham, G., & Sahay, S. (2006). Research on information systems in developing countries. *Information Technology for Development, 12*(1), 7-24.

Walsham, G., Roby, D., & Sahay, S. (2007). Special issue on information systems in developing countries. *MIS Quarterly, 31*(2), 317-326.