1.1 Introduction

The globe is turning from formal to informal, analog to digital, local and stand alone to worldwide. There is a move from “no computer to know computer”. The shift is from face to face to electronic communication, from circular to direct communication, from general channels to dedicated channels. At the same time, we are moving from primary to secondary, real to virtual. The world has become an open system with TV satellite channels available. We can be on WWW any moment. We can rely lifetime on telephone services, cable network and internet. Satyam, BSNL, INFINET have made us more mobile. Gyan Darshan and Gyan Vani are around the clock education channels. There are virtual learners, virtual teachers and virtual classrooms (Goel & Goel, Earnest, 2003).

Information Technology has gone out of its adolescence stage reaching adulthood claiming its independent existence. Togetherness of information and communication technology takes out of stereotyped world of chalkboard to exciting Information highway (Kumar, 2003). In a rapidly changing world, within a really short span of time, we have moved from ‘Industrial age’ to ‘Information age’. In the new millennium, we have seen the emergence of a society appropriately called be a ‘Knowledge Society’ ....and what is important in this society is not just swallowing of information capsule but the cultivation of mind that knows how to handle this information (Sikdar, 2002).

Our societal fabric is under tremendous change. There is a drastic change in the world we are living in. Through the Agricultural Revolution (first wave change) to Industrial Revolution to Information and communication technology revolution (third wave change) technology changed the total society (Devmani, 2003).

Man has started sharing his feelings with media. We have started identifying virtual reality than real objects. We, the teacher educators, need to be more Pedagogues to techno-pedagogues (Goel & Goel, Earnest,
Our social system is going to adopt and absorb alien social cultural practices which have a consequential effect upon our education system (Rao, 2002). The knowledge we use today will largely be obsolete tomorrow, so will many of the tools. (Weiland, 1993). Therefore, it is time to realize that the effective teaching methods of the past can’t ensure the future success of the students and use of computers as well as future educational technologies can only help students to grasp the impact that technology has on human life (Wright, 1994). Technology is becoming more and more pervasive at a rate unmatched by any other educational development. Technology has improved learning, which is the impetus behind “techno-sizing” education (Savaliya, 2002)

1.2 Technology

But what is technology? The use of the term *technology* has changed significantly over the last 200 years. Before the 20th century, the term was uncommon in English and usually referred to as the description or study of the useful arts. The term was often connected to technical education. "Technology" rose to prominence in the 20th century in connection with the Second Industrial Revolution. The meaning of technology changed in the early 20th century when American social scientists, translated ideas from the German concept of *Technik* into "technology." In German and other European languages, a distinction exists between *Technik* and *Technologie* that is absent in English, as both terms are usually translated as "technology." By the 1930s, "technology" referred not to the study of the industrial arts, but to the industrial arts themselves. In 1937, the American sociologist Read Bain wrote that "technology includes all tools, machines, utensils, weapons, instruments, housing, clothing, communicating and transporting devices and the skills by which we produce and use them." Bain's definition remains common among scholars even today, especially social scientists. But equally prominent is the definition of technology as applied science, especially among scientists and engineers, although most social scientists who study technology reject this definition.

Dictionaries and scholars have offered a variety of definitions of technology.
The Merriam-Webster (2007) dictionary offers a definition of the term: "the practical application of knowledge especially in a particular area" and "a capability given by the practical application of knowledge"

Franklin (1989) "Real World of Technology" lecture, gave another definition of the concept; it is "practice, the way we do things around here"

Stiegler (1998) in Technics and Time, defines technology as "organized inorganic matter." Technology can be most broadly defined as the entities, both material and immaterial, created by the application of mental and physical effort in order to achieve some value. Technology is the application of scientific knowledge to the practical tasks of life. Technology is the science of techniques, of doing things in a particular way i.e. methods of doing and getting things done, related to any art, science or to a particular profession. It is not just one prescribed technique, but it is scientific way of development of new techniques also. It is not just about machines, diagnosis of patients by doctor is also a technique.(Pandya,Zevari & Thakuria,2003)

The word “technology” can also be used to refer to a collection of techniques. In this context, it is the current state of humanity’s knowledge of how to combine resources to produce desired products, to solve problems, fulfill needs, or satisfies wants; it includes technical methods, skills, processes, techniques, tools and raw materials. When combined with another term, such as "medical technology" or "space technology", it refers to the state of the respective field's knowledge and tools. " as we pedagogues use the term Educational Technology.(Savaliya,2003)

Technology can be viewed as an activity that forms or changes culture. A modern example is the rise of Communication Technology, which has lessened barriers to human interaction and, as a result, has helped spawn new subcultures; the rise of Cyberculture has, at its basis, the development of the Internet and the computer. Technicism is an over reliance or overconfidence in technology as a benefactor of society. Taken to extreme, technicism is the belief that humanity will ultimately be able to control the entirety of existence using technology. In other words, human beings will someday be able to master all problems and possibly even control the future using technology.
So technology is not just about machines and equipment, technology is the extension of human abilities, competencies and talents in using machines and equipments to get information by overcoming barriers of time, space, expenses and efforts (Garg, 2003). “It has become appallingly obvious that our technology has exceeded our humanity” Albert Einstein (1946) once said.

Since technology deals with information – the essence of knowledge- it has a profound effect upon how students learn, where they learn and what they learn. Information is ‘a single data element’ It also affects the type of communication they have among themselves, e.g. from face to face communication in online teaching, it is virtual communication (Aggarwal, 2003)

1.3 Communication

“Communication,” which is etymologically related to both “communion” and “community,” comes from the Latin term communicare, which means “to make common” (Weekley, 1967) Also Communication, comes from the Latin communis, "common." When we communicate, we are trying to be "common." When we communicate, we are trying to establish a "commonness" with someone. That is, we are trying to share information, an idea or an attitude. DeVito (1986) expanded on this, writing that communication is “The process or act of transmitting a message from a sender to a receiver, through a channel and with the interference of noise”. Some would elaborate on this definition, saying that the message transmission is intentional and conveys meaning in order to bring about change.

Currently, many definitions of communication are used in order to conceptualize the processes by which people navigate and assign meaning. Communication is also understood as the exchanging of understanding. We might say that communication consists of transmitting information from one person to another. In fact, many scholars of communication take this as a working definition, and use Lasswell's maxim, "who says what to whom in what channel with what effect," as a means of circumscribing the field of communication theory (Lasswell, 1948)

Communication Theory has one universal law given by Scudder (1980). The Universal Communication Law states that, "All living entities,
beings and creatures communicate." All of the living communicate through movements, sounds, reactions, physical changes, gestures, languages, breath, etc. Communication is a means of survival. Examples - the cry of a child (communication that it is hungry, hurt, cold, etc.); the browning of a leaf (communication that it is dehydrated, thirsty per se, dying); the cry of an animal (communicating that it is injured, hungry, angry, etc.). Everything living communicates in its quest for survival."

Communication as an academic discipline, sometimes called "communicology," relates to all the ways we communicate, so it embraces a large body of study and knowledge. The communication discipline includes both verbal and non verbal messages. A body of scholarship all about communication is presented and explained in textbooks, electronic publications, and academic journals. In the journals, researchers report the results of studies that are the basis for an ever-expanding understanding of how we all communicate. At this juncture, it is desirable to examine the various views of scholars on what constitutes “communication”. The word “Communication” has been given different meanings by different scholars.

Lewis (1975) “Communication means sharing messages, ideas, or attitudes that produce a degree of understanding between a sender and receiver.”

Havelka, Beagle and Looms (1976) believed that communication is “the process by which information, decision and directives pass through a social system and the ways in which knowledge, opinion and attitudes are formed.”

Another expansive definition of communication is ‘one system, a source, influences another, the destination, by manipulation of alternative symbols, which can be transmitted over the channel connecting them’ Man has evolved a host of different systems of communication in the form of different technologies. With changes in modes of communication content and form of communication has changed. From pigeons to postcards to telephone to mobile to video conferencing, technology has advanced a lot (McQuail and Windahl 1993).

Communication is “transmission of information” (Aggarwal, 2003).
The definition of communication is shared in the Webster's Dictionary (2007) as "sending, giving, or exchanging information and ideas," which is often expressed nonverbally and verbally.

“Two-way process of reaching mutual understanding, in which participants not only exchange (encode-decode) information but also create and share meaning” (www.businessdictionary.com, 2010)

**MAPPING CONCEPTUAL FRAMEWORK**

1. **Classical Communication Models**

**Aristotle’s Model of Communication**

*from Ehninger, Gronbeck and Monroe*

A Speaker . . .

- **discovering** rational (logos), emotional (pathos) and ethical (ethos) proofs (pozits)
- **arranges** those proofs strategically,
- **clothes** the ideas in clear and compelling words
- **delivers** the product appropriately

![Diagram of Aristotle's Model of Communication](image)

Fig:1.1 Aristotle’s Model of communication given around 300 B.C.

*Artsotle’s model of proof.* Kinnevey also sees a model of communication in Aristotle’s description of proof:
- Logos, inheres in the content or the message itself
- Pathos, inheres in the audience
- Ethos, inheres in the speaker

2. **Lasswell’s Model of Communication (1948)**

Political scientist Harold Lasswell, writing in 1948, posed the question, “Who says what in which channel with what effect?” . His model includes considerations of a variety of factors being considered to determine the
impact of a communication. To illustrate the significance of each element of the model, try visualizing what effect some dynamic speaker would have if the medium were print, or what would happen if the audience didn’t speak the same language. A visualization of Lasswell’s model appears in Figure 1.2

![Communication model diagram](image)

**Figure:1.2.** A visualization of Lasswell’s model appears in 1948

The **two-step flow of communication** (Lazarsfeld, 1944) model hypothesizes that ideas flow from mass media to opinion leaders, and from them to a wider population. It was first introduced by sociologist Paul Lazarsfeld, Berlson & Gaudet in 1944—and elaborated by Elihu Katz and Lazarsfeld in 1955 and subsequent publications.

Based on the two-step flow hypothesis, the term “personal influence” came to illustrate the process intervening between the media’s direct message and the audience’s reaction to that message. Opinion leaders tend to be similar to those they influence—based on personality, interests, demographics, or socio-economic factors. The two-step theory refined the ability to predict how media messages influence audience’s behavior and explains why certain media campaigns do not alter audiences’ attitudes.

The original two-step flow hypothesis—that ideas flow from the media to opinion leaders and then to less active sections of the population—has been criticized and negated by myriad consequent studies. They find substantial evidence that initial mass media information flows directly to people on the whole and is not relayed by opinion leaders. Furthermore, the
two-step hypothesis does not adequately describe the flow of learning. If a person is exposed to new observations that are inconsistent with present beliefs, he or she is thrown into imbalance.

3. **The Shannon-Weaver Mathematical Model, 1949**

Claude Shannon, an engineer for the Bell Telephone Company, designed the most influential of all early communication models. His goal was to formulate a theory to guide the efforts of engineers in finding the most efficient way of transmitting electrical signals from one location to another (Shannon and Weaver, 1949). Later Shannon introduced a mechanism in the receiver which corrected for differences between the transmitted and received signal; this monitoring or correcting mechanism was the forerunner of the now widely used concept of feedback (information which a communicator gains from others in response to his own verbal behavior).

**The Shannon-Weaver Mathematical Model, 1949**

![Figure 1.3: The Shannon Weaver Mathematical Model of communication, 1946](image)

4. **Berlo's S-M-C-R, 1960** is Essentially an adaptation of the Shannon-Weaver model.
1.4 Future Challenges:

Thus, this new technology in the form of Digital Revolution challenges the educators to reassess their roles and responsibilities. This information blast has changed the communication process between the educator and the educand. Communication has a long history, as long as that of human race. At the primitive stage people developed simple ways and means of communication. In the due course of time new sophisticated technologies were invented and used to expand the ability to communicate effectively and efficiently across longer distance over longer periods of time (Mahajan, 2003). If it keeps up, man will atrophy all his limbs but the push-button finger. said Frank Lloyd Wright (1945) while commenting on use of technology in mass destruction in Hiroshima and Nagasaki atomic bombs.

Chalkin, Hedegaard, Navarro & Pedraza (1990) use an interesting metaphor to link computers and education – they view that the computers are like carts - they help to carry the educational load, provided there is some means to pull it. Educational theory is the horse that draws the cart of educational application of computers.
In the age of WWW, Media explosion has lead to Knowledge explosion. So we the educators need to move from pedagogues to techno - pedagogues. There is need to move from general literacy i.e. Reading, Writing, Arithmetic to Media Literacy to Information Technology Literacy Media literacy covers the ability to access, analyze, produce and evaluate information through a variety of media. (Goel & Goel, Malhar ,Earnest 2003). Information Technology Revolution. has changed the ‘paper nightmare office’ to ‘paperless office’ (Devmani,2002). So it could be safely said that the arrival of Information & Communication Technology have been reengineering almost all the fields of human life. Because it is not only a technological evolution but also a social evolution that forces the different age group of human to discover new habits, new morals, and formulate new life systems, so that to adopt with global change in human culture and life style (Rahuman & Wikramnayake,2009).

But the present scenario is that all the teachers are not willing to use technology in education. It has been found that teachers use computers more at home than at school. Or teachers don’t have access to such bagful of information. Changing existing pedagogy or planting new pedagogy among existing teachers with traditional mindset is a challenging task. Mostly, technology is known for lessening gaps, but in reality it has created gap between teacher and student, rural and urban and in many more areas. This gap between the ‘information haves’ and ‘information have nots’ creates gap called ‘Digital Divide’ (Srivastva,2003).

So our educational system also has to be geared to meet this concept and has to be aligned with this new technology. Hence the innovative utilization of ICT for education is becoming most indispensable need.

1.5 INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) - MEANING AND DEFINITION

Information and communication technology is the technology of present and future. However, if there are enormous disparities in nations in using technology, it will lead towards “Information Poverty” in nations less fortunate (Garg,2003). Compared to traditional assistance, Information and
Communication technology has deeper geographical penetration. The consensus of opinion among social scientists and business planners is that information and communication technology is growing in area in the foreseeable future which can create immense opportunities in the coming years. (ChanDrakar & Ashutosh 2003).

The use of ICT in education lends itself to more student–centered learning settings. And it often creates tension for some teachers and students. But with the world rapidly moving into digital media and information, the role of ICT is becoming more and more important. And this importance will continue to grow in 21st century. (Sharma, 2011) There have been a number of factors impeding the wholesale uptake of information and communication technology (ICT) in education. These have included such factors as lack of support, the purchase of the technology, a lack of training among established teaching practitioners, lack of motivation and need among teachers and students to use ICT as teaching and learning tools (Starr, 2001).

It is time to break the syndrome of intellectual poverty and acquire intellectual expertise through Infotech reality.

ICT is an acronym which stands for information and communication technology. UNESCO (2003) defined IT (information technology) is the term used to describe computer hardware and software “to access and retrieve information, and store, organize, manipulate and present it by electronic means”. While items of equipment such as personal computers, scanners and digital cameras are included in the hardware category, database storage and multimedia take place in software category.

While ICT offers more than computers, but any technology involved in communicating such as software, CD-ROMs, internet, television and radio, image capturing devices etc (Alsop and Hicks, 2001).

The term digital divide refers to the gap between the “haves” and the “have nots” in society between those who have access to ICT and those whose access is limited or non-existent. The digital divide may occur between countries in the Asia-Pacific region because certain nations are less developed economically, or because they have less developed infrastructures. The digital divide may occur within a country because of
differences in resources between metropolitan and rural areas, or within cities between affluent and less affluent schools. The digital divide may occur within schools because some families have internet access at home while other families do not, and this can affect school policy on homework expectations. The digital divide may also occur between boys and girls because at home parents often favour boys when it comes to accessing ICT, or it may occur at school because boys tend to dominate when ICT access is limited. And the digital divide may occur between age groups where, for instance, senior citizens have no previous experience with ICT. (Anderson, 2010)

Any child born since the beginning of this century is growing up in a digital world. Those born at the start of the century, already in the middle years of primary school, have been dubbed the “Net generation” or, more descriptively, “digital natives” (Prensky, 2001). Theirs is a world of television, text messaging, camera phones, iPods, MP3, and interactive video games. They can watch television, listen to their iPods, send text messages, and work online – all at the same time. As they chat online with friends, they use a form of shorthand they have created themselves like WBU (what ‘bout you), BRB (be right back), IRL (in real life), NP (no problem), and ROFL (rolling on the floor laughing). Parents of these modern children, born in the last century, are labelled by Prensky (2001), in contrast to their children, “digital immigrants”. Because they were not brought up in the digital age, parents are often bewildered by the new language and cannot comprehend how their sons and daughters seemingly multi-task while doing their homework.

The digital age refers to a period that began about 30 years ago and has rapidly continued into this century. It is sometimes called the digital revolution because during this time analogue technologies began to change to digital technologies. This same period parallels far-reaching changes in society brought about by ICT, similar to past, life-changing events that occurred with the start of the agricultural revolution and again with the onset of the industrial revolution (Unesco report 2005).
To gauge the stage of ICT integration reached by a country, a district, an individual school, or even a class within a school, a model is presented as shown in Figure 1.6. Such a model serves as a representation of the integration of ICT in education, a kind of scaffold or framework. Knowing what stage schools are at in the integration of ICT across the curriculum is useful, for example, in the allocation of resources to schools, as well as in teacher education in the preparation of teachers. The model has achieved high recognition in the region, due largely to its dissemination in UNESCO publications (Anderson and van Weert, 2002; Anderson and Glenn, 2003; and Majumdar, 2005)
Figure 4: Stages that schools typically pass through in adoption and use of ICT

Figure 1: Technology adoption Model by Anderson

Information convergence between information technology and communication technology opened a new technology called Information and Communication Technology. Information and Communication Technology is the use of hardware and software for efficient management of information i.e. storage, retrieval, processing, communication, diffusion and sharing of information for social, economic and cultural upliftment (Sansanwal, 2000).

Information and Communication Technologies are electronic devices and/or associated with human interactive material that enables user to employ them for a wide range of teaching and learning processes in addition to personal use. ICT includes computers, videos, televisions, connection with computers, sensors, switches, interface boxes, internet which links computers globally together, telecommunication, satellite connections and all the software and material which enables us as teachers to use them to teach our pupils. Just as television would be useless without visual and audio material reaching it through an aerial, cable or video which we can watch, so a computer needs software to make it communicate with us, the user (Cox, 1999).

The last two decades have witnessed a worldwide proliferation of information and communication technologies into the field of education. The global adoption of ICT into education has been premised on the potential of new technological tools to revolutionize an outmoded educational system, better prepare the students for information age and accelerate national development efforts. In developing countries, in particular, the above premises have generated a whole set of wild speculations about the necessity of educational reforms that will accommodate the new tools (Pelgrum, 2000). Soule (2003) stated that “ICT” is internationally recognized as a term meaning using technologies for communicating.

CTA (2003) Information and Communication Technologies are technologies which facilitate communication and thus the processing and transmission of information electronically.
Thus ICT is= IT+ other media (Sansanwal, 2009)

Governments in most of the developing countries have responded to the challenges by initiating national programs to introduce computers into education. It is significant to mention that Government of India launched ‘OPERATION KNOWLEDGE’ as a part of the Information Technology Action Plan. Under this plan it was planned that Computers and Internet facility shall be available in every school college and university for providing quality education (Maheswari, 1998) by 2008 as in the IT action plan. Microsoft, along with NCERT, has now started developing lessons with the help of content developers. Govt has included ICT in schools by setting up IT labs and issuing PCs to schools.

A recent NASSCOM survey indicates that more than 75% graduates being produced by Indian universities are NOT employable. So there is now growing need to teach job specific skills and to bundle the curricula with globally recognized certifications to be able to quickly respond to changing market needs. The Prime Minister of India has fixed a target that by 2022 at least 5 crore Indian youth have to be technically trained (Gupta, 2009).

But what is the present scenario with regard to ICT in developing and developed countries?

British Educational Communications and Technology (BECTA 2005) developed a framework of ICT competence to guide institutions in their decisions about the role of ICT technical support staff. The framework divides each of the possible functions into four levels i.e. teaching assistant, ICT technician, senior ICT technician, and ICT system manager. And enlists the competencies under four main skill areas – Technology, Support, Development and Personnel (BECTA, 2005) University of Hull offered a course ‘M.Ed. in e-Learning’ through online mode.

According to an Education Week Survey, nearly 30% of teachers said that their students use computers only one hour per week. Nearly 40 percent said that their students don’t use computers in the classroom at all (Trotter, 1999).

Goel, Goel & Earnest (2003) states that out of about 11562 colleges in India 10% have internet. Out of 250 universities in India 5% have internet.
Rarely the universities and colleges are inter-connected. The schools and colleges of education don’t have adequate ICT facilities. In the outer world there is a move from primitive and print media to modern electronic media and multimedia. Majority of our schools and colleges are still compromising with chalk and talk. Computers, computer labs and media are more for exhibition than for education.

But in the developed countries, computers have become a fixture in the country’s schools. Children are growing up in a rapidly changing world. In 1980 less than 20 percent of elementary, junior and senior high schools in the U.S. were equipped with micro computers. Less than a decade later, virtually all public schools had some computing ability (U.S. Bureau of the Census, 1989). Similarly students’ access to computers has increased dramatically from more than 60 students per computer in 1984 to approximately six students per computer in 1998 (U.S. Bureau of the Census, 1998).

One developing country that is currently pursuing the technological track in education is the Syrian Arab Republic. Recognizing the challenge of the Information Age the Syrian Ministry of Education has recently adopted a national plan to introduce computers and informatics into pre-college education. To this end, the ministry inaugurated equipped, labs within secondary schools for general vocational and technical education. It has also connected many schools to Internet (Albrini, 2004). Teacher educators are yet to realize how to go for “Learning to Learn”. (Sarangi, 2003)

Just as Literacy and Numeracy have become imperatives in school Education, so too have technacy (Seeman, 2000). ICT have had an enormous impact on society. “A third revolution” is how UNESCO describes their impact in a 200+ page report, Towards Knowledge Societies (UNESCO, 2005b)

1.6 ICT – present scenario in India

Indian educational scenario is changing rapidly. Prior to invention of communication technologies, chalk and talk methods were used in Indian classrooms. Gradually with the invention of new technologies gadgets like radio, T.V, recorder, slides, and projectors took the forefront. Projects like EDUSAT and INSAT etc. changed the face of Indian education system. Out of
about 11562 colleges in India, 10% have internet. Out of 250 universities, in India 5% have internet. Rarely the universities and colleges are interconnected. (Goel & Goel, Earnest, 2003) States like Andhra Pradesh and Karnataka are trying to make their states like California and Silicon Valley through IT. Gujarat is also working on plans of “info cities” Introduction of concept of Smart schools is one among the efforts of government to popularize ICT

UGC(2004) underlined notable initiatives in education in India include:

- Indira Gandhi National Open University (IGNOU) uses radio, television and internet technologies.
- National Program on Technology Enhanced Learning: a concept similar to open course work initiative MIT. It uses television and internet technologies.
- Eklavya initiative uses television and internet for distance education.
- IIT Kanpur has developed “Brihaspti” an open source e-learning platform (Virtual Classroom)
- Premier institutes have entered a strategic alliance with NIIT for providing education through virtual classrooms
- Jadavpur university is also a mobile learning centre.
- IIT- Bombay has started the program of CDEEP (centre for distance engineering education program)
- One laptop per child (OLPC) in Maharashtra.

Satish, CEO Of OLPC (2010) quoted that education without technology in modern times is like keeping the child in Dark Ages.

Dr. ZH Khan, Director FTK-centre for Information and Communication Technology in Jamia Millia Islamia, stated in Digital Learning (2010) that ICT equipment offer 24 x 7 learning.

ICT has the potential to synchronize head, heart and hand. It has clouded our life so thickly that days are not far when we shall have online schools in our country. So it is time to move from Media Confusion to Media Fusion or from Media Crowd to Media Culture. The marriage of computer science and learning theory is the need of the hour. Its time to shift focus from
concern with the present to focus on future. One must distinguish between learning about computers and learning through computers.

There were over 364 million computers in use world wide by the end of 1998 (Computer Industry Almanac, Inc., 1999). By 2000, the world had 414 Internet users with increasing use from Asia, Latin America, and parts of Europe. (Concord, 2000). The same year the number of online index table documents surpassed one billion and the number of countries to grow by 3.2 million new pages every day (Lebo, 2000). This astounding growth of information and communication technology is rapidly transforming the global community by expanding access to information, accelerating, communication, restructuring commerce and reshaping education. In a world, which is increasingly dependent upon access to knowledge, and information, computers have become central to economic, educational and social survival, unfortunately, access to computers and Internet is not universal.

Annan (2001), UN Secretary General, quoted that 85% of Internet users live in developed countries and 90% of Internet hosts are located in these countries. Dawka (1996) succinctly puts it as “one can’t talk about representative development without talking about computers.” Without computer literacy, third world nations can’t fully participate in and benefit from the current global exchange of information, trade and technology.

Nations at the periphery of world technologies must enhance ‘their ability to access, produce and use information as full and equal participants of the global community (Tallah, 1996)

1.7 ICT IN EDUCATION

‘The demise of the book has been planned for centuries...today’s book-of-the-classroom is CD-Rom.’ quoted Gershenfeld (2000) in his book “When things start to think”. In the book *The Information Technology Revolution* Dede(2007) in chapter ‘Educational and Social Implications’ reveals that potential consumers of Educational Technology include very young children, students at every level of formal education, recipients of industrial or professional training, the aged, the adults engaged in formal learning activities-in short virtually everyone in society. In the same book in
chapter ‘Computers and Children’ Seymour Papert (2007) clearly stated that in many schools ‘computer aided education’ means making the computer teach the child. So this age is called “Computeropia” by Masuda(2007) in the chapter ‘Parameters of the Post Industrial Society. 

1.8 THEORIES FOR MEDIA USAGE

First model is Social Information Processing Model that suggests that the adoption of organizational technologies and communication media can be more fully explained by looking at the social environment of the institution or the organization. In adopting this model Fulk, Schemetiz and Steinfield(1990) argued that behavior occurs in a social world that is far from neutral in its effects.

Communication interaction can directly influence “attitude towards the communication Media” and “Media use behavior”(Miller, 1999)

In addition to this Model, Sitkin, Sutcliff and Barrios-Chaplin(1992) gave a Dual capacity Model of media choice. According to it, any communication medium conveys two kinds of messages. One message involves “Data” and the other involves “Meaning.” It means every organizational medium has a data carrying capacity defined as “the degree to which a medium is able to effectively and efficiently convey task-relevant data.”

1.9 TEACHERS ATTITUDE TOWARDS ICT

The quality of human resources is a major factor of success for all the countries in new century. In this global village, quality of intellectual capital of a country is becoming more important than the financial natural or other sources. To survive in this highly competitive world the first requirement is its trained technical people. Strength of all countries lies in their abilities to produce, absorb and disseminate knowledge. That’s why system particularly education system needs to prepare such manpower which can face the challenges of in this changing scenario where technology rules our life. So the introduction and development of ICT into schools depends only on quality and ability of teachers. As is often said “An educational system can only be as good as its teachers”. (NCTE)
Today in cybernetic society of e-education, e-business, e-tutoring teachers are not only knowledge givers, but also harbingers for the changes in socio-economic systems. The teachers and educationists who are still unfamiliar with computers may easily feel the threat of professional obsolescence.

Our attitude is which determines our favorable or unfavorable reactions to environment stimuli to which we are exposed. It also determines the matrix of our social, religious and cultural institutions in which we work and develop our personalities and attitude towards life.

Attitudes are in turn influenced by and influence these institutions. By knowing about the attitude of a person we come to know that what in his life is significant or insignificant. So the importance of attitude in life is universally acknowledged. Attitudes determine our actions. They powerfully determine our behavior towards our profession and also towards other areas of life.

Indeed there is hardly any object or activity or procedure or idea or occupation towards we don’t have an attitude. Attitude supply the code by which the behavior of the individual and others is judged. Furthermore, attitudes supply principles on the basis of which choices are made. It also determine our attractions and repulsions for most of the objects in our life.

Since the goal of our education system is our wholesome development of human personality. It is essentially concerned itself with the creation an environment in which development of all round personality can be facilitated and ensured.

Hence there is a close connection between education and attitudes. But first it is required to understand what attitude is?

Allport (1935) defined attitude as “a mental and neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual’s response to all objects with which it is related.” Attitude is defined as a positive or negative feeling associated with performing a specific behavior (Ajzen & Fishbein, 1980). He indicated that attitudes consisted of three elements—affect, cognition and behavior. Affect element is individual’s liking of a person or or an object. Cognitive element refers individual’s knowledge of a person or object. The Behavior element is overt
behavior of individual towards a person or object. According to Ajzen & Fishbein for complete detail of attitude the knowledge of three components is required.

Attitudes have intellectual, biological, social and emotional components that are derived from experience and exercise a determining influence upon behavior. Attitude is defined as a developmental state of organismic Valence created by psycho-biological processes, exerting a motivational influence upon the individual’s responsive behavior in situations directly and indirectly related to it (Skinner, 1992).

Smith and Farbinger (2000) explained that within contemporary psychological research the term attitude is typically used to refer to a relatively general and enduring evaluation of some object, person, or concept along a dimension ranging from a negative to positive.

Fox and Hermann (2000) explained that teachers have following 5 type of stances towards technology –

1) **Neutralitarian** - i.e. Online approaches make no significant difference to learning.

2) **Boosters** – The new online approaches will improve learning and make education more effective and efficient.

3) **Oppositional** – Technology over-simplifies complex teaching and learning processes and practices. The danger is that ultimately machines will take the place of teachers.

4) **Sceptic** – Sceptics are hesitant to use technology unless the advantages in doing so are obvious.

5) **Transformationalist** – Online approaches radically changes teaching and learning processes and curricula.

Majority of our teachers are away from using the simplest electronic teaching aids. It may be due to lack of attitude and training. It may also be due to psychological and cultural factors. But it has created categories like “computer literate” and “computer illiterate” teachers. So we have to be cautious as we can’t declare the death of technology and can’t go to primitive age.
Diffusion of Innovations is a theory of how, why, and at what rate new ideas and technology spread through cultures. The concept was first studied by the French sociologist Gabriel Tarde (1890). Five stages of the adoption process

**Figure: Stages of adoption process (1890)**

**Knowledge**

In this stage the individual is first exposed to an innovation but lacks information about the innovation. During this stage of the process the individual has not been inspired to find more information about the innovation.

**Persuasion**

In this stage the individual is interested in the innovation and actively seeks information/detail about the innovation.

**Decision**

In this stage the individual takes the concept of the innovation and weighs the advantages/disadvantages of using the innovation and decides whether to adopt or reject the innovation. Due to the individualistic nature of this stage Rogers notes that it is the most difficult stage to acquire empirical evidence (Rogers 1964, p. 83).

**Implementation**

In this stage the individual employs the innovation to a varying degree depending on the situation. During this stage the individual determines the usefulness of the innovation and may search for further information about it.
Confirmation

Although the name of this stage may be misleading, in this stage the individual finalizes their decision to continue using the innovation and may use the innovation to its fullest potential.

Rogers (1995) in his Theory of the Diffusion of Innovations indicated that an understanding of the culture and environment in which a technology is introduced is a prerequisite to understand how best to promote its adoption. According to Rogers’ model, many factors contribute to whether an individual develops favorable or unfavorable attitudes towards an innovation, and consequently accepts or rejects it.

Rogers described five main attributes of an innovation that influence the attributes of potential adopters. It is tried to explain it diagrammatically-

![Figure 1.7 Five Attributes of An Innovation (Rogers, 1995)](attachment:image)

1.10 Gender and ICT

Some teachers have reported that use of ICT varies with gender differences. The attitude of male and female teachers is different towards ICT. Women are significantly less comfortable than men in dealing with computers (Gilory and Desai, 1986)

It is found that boys spend more time online than girls. Even if girls and boys spent equivalent amounts of time online previous research both (academic and marks based) suggested that they might display gender
stereotypical preferences in their choices of activity (Subrahmanyam & Subramanyam, Kraut, Greenfield and Gross 2001).

1.11 Theoretical explanations

Empirical data is more useful if explanatory and predictive principles can be extracted from it. This would allow us to make generalizations at the level of abstractions. The theory which had already been used to examine issues of gender and ICT. In particular reviewed Bourdieu’s notion of habitus (Bourdieu 1990) as it has been used to understand gender differences (McNay 1999; Kvasny 2005); Feminist Standpoint Theory (Ratliﬀ 2006; Nsibirano 2008); Critical Information Systems research on frameworks of power (Trauth and Howcroft 2006); and Expectations States Theory (Adibifar 2007).

1. Expectations State Theory

Drawn from organisational psychology and most frequently based on quantitative data, expectations state theory is based on the premise that individuals conform to societal expectations of performance based on their gender (Balkwell 1991). For example, if males are expected to be better at using computers then the “status characteristics” (the term used by this theory to describe gender, age, skills, experience) of gender are relevant to their personal expectation of their computer ability. It is applied most often to team work in organizations where the relationship between expectations and performance are examined. It has also been used to understand gender stereotypes in society, for example differential wages between men and women in Israel (Moore 2006) and gender differences in students perceptions of the use of ICTs (Adibifar 2007). It appears that the main usefulness of this theory in our context is the broadening of focus beyond “just gender” to incorporate other aspect of an individual’s background namely age, access, skills and experiences. And whilst it is based on assumptions about “widely held societal perceptions” (Balkwell 1991), it is flexible enough to be able to examine differences between differences in these societal perceptions between different cultural groups” (Moore 2006). In many ways this is similar to self-fulﬁlling prophecy theories as there is evidence that expectations from others inﬂuence individuals’ achievements.
2. **Critical IS theory**

The focus of Critical IS theory is not merely an attempt to describe or observe gender differences or document how they come about but is a way of investigating why an inequality exists, and to search for underlying causes. This moves the research away from an exclusive focus on individuals, situations and local meanings to the systems of relations which make the meaning possible (Trauth and Howcroft 2006). Thus attention is focused on power relations, marginality and dominant discourses in a broader organisational and societal context. Critical IS theory has explicitly been used to understand issues related to women and IT: for example, women’s recruitment and retention in the IT field (Trauth and Howcroft 2006), and the digital divide amongst women minorities (Trauth, Kvasny et al. 2007). It seeks examples of individuals’ overt and covert power plays as well as indications of resistance, solidarity and support, thereby illustrating how people are challenging and transforming what is taken for granted.

Critical IS theory is useful in terms of our data in that it enables the examination of female students’ agency in terms of power and actively provides a way of understanding how people step beyond their constraints.

3. **Feminist standpoint theory**

Standpoint theories view the world from the position, point of view or insights of an individual. According to this approach, a person’s standpoint influences how people construct their world socially, and is influenced by the social groups a person is a member. Standpoints are therefore different between different social groups. Feminist standpoint theory’s starting point of enquiry is women’s experiences and its based on the assumption that women’s lives and roles in society are different to that of men’s; because of their sociological position in society women see things differently. It has been used by (Kvasny 2006) as a lens for unpacking African-American women’s use of ICTs and by Clegg as a way of looking at gendered meanings in the relationship between education and computing (Clegg 2001). It is useful for our research in that it illuminates women’s interests and needs, their experiences and their situated knowledge.
4. Bourdieu’s theory of habitus

Bourdieu’s notion of habitus encompasses a set of dispositions that are learned over one’s life history and which mediates and guides individuals’ practices. Its application to gender issues has been contested. While Bourdieu used the notion of habitus to understand gender divisions in his book, he has been criticized by feminists for not foregrounding gender domination and for not acknowledging the women’s movement in his research. Some researchers have criticised habitus for being an unchanging, “obstinate” set of dispositions (McNay 1999; Thapan 2006). Recently habitus has been adapted to understand gender identity (Laberge 1995; Johnson 2005), to explore the specific experiences of African-American women using ICTs (Kvasny 2005) and to unpack gender and mobile learning (Taylor). Its value in terms of our data is that it provides a multi-faceted way of exploring several dimensions: power relations, social status and economically opposed structures; individuals’ past experiences and life histories; and taken-for-granted cultural assumptions.

Determining a theoretical option

This review shows that all of these theoretical perspectives would be useful in understanding gender and ICT issues in our developing country context, we find that States Expectations Theory and Feminist standpoint theory both have as their point of departure a fixed notion of a particular way in which women view the world. Also whilst gender has and will be a focus of our future research we situate our gender enquiry within a broader framework of students (both male and female)’s access to and use (or non-use) of ICTs and therefore using a lens such as feminist standpoint theory might exclude or detract from the male students’ perspectives. Whilst Critical IS theory offers a useful focus on power relations, this has limitations and would not provide a framework that facilitates an explanation of female students’ agency nor explain why some female students might choose to operate within structural/societal constraints.

Although concerns have been expressed about Bourdieu’s notion of habitus for gender inquiry and few people have explicitly used the notion of habitus to investigate the issues surrounding women and ICTs, it does seem
that this framework could offer the most flexibility in terms of our overall research aims whilst still enabling illumination of gender specific issues. It is to note that the concept of habitus obviously has some resonance in our field as it appears almost subliminally in the literature by researchers (Johnson 2005; Kress and Pachler 2007); it has been used by new literacy theorists in their work on ICTs. In particular Bourdieu’s framework offers us the opportunity to incorporate individuals’ contexts; to examine the intersection between gender, socio-economic group and language; to consider how both male and female students experience ICTs; and to include the influence of social backgrounds. It provides a way of examining both individual and collective experiences, it focuses on both the mental and the material, and it also allows for an examination of power relations. (Brown and Czerniewicz, 2006)

1.12 Motivation

Plato in “The Republic” expressed a belief that people must be well educated to be able to rule the republic. It is therefore necessary to “compel the best minds to attain knowledge” (Plato, 2001) This compelling to become educated and compelling to serve is one form of motivation. As illustrated by Plato’s statements, the discussion of motivation dates back to early scholars. More recent writings illustrate a number of motivational theories. Mook (1987) said that the scientific study of why people are motivated or unmotivated is a recent development in human history McClelland (1987) wrote, “The psychology of motivation is a broad and loosely defined field. It covers everything from detailed investigations of psychological mechanisms involved in animal drives to elaborate analyses of the unconscious motives” (preface).

Motivation is the activation or energization of goal-orientated behavior. According to various theories, motivation may be rooted in the basic need to minimize physical pain and maximize pleasure, or it may include specific needs such as eating and resting, or a desired object, hobby, goal, state of being, ideal, or it may be attributed to less-apparent reasons such as altruism, selfishness, morality, or avoiding mortality. Conceptually, motivation should not be confused with either volition or optimism.

Motivation refers to initiation, direction, intensity and persistence of behavior. (Geen, 1995). There are three main types of motivation:
intrinsic/extrinsic motivation, social motivation and competence and efficacy beliefs. When we do activities for their own sake, out of interest, and to reward themselves with an internal feeling, we are intrinsically motivated. We are extrinsically motivated when they do activities to get a tangible reward or for instrumental reasons, (Baker, Dreher, & Guthrie, 2000). Schools often are structured to motivate students extrinsically with grades, stickers, certificates, and other rewards. Social motivation concerns the student’s motivation to relate to other children. Competence and efficacy beliefs refer to how the child assesses their ability at different activities;

Motivation is the study of human behavior and the factors that stimulate action. There are three major categories of motivation theories. These are Classical Organizational theory, Human Relations Approach and Behavioural Science Approach. The classical organizational theory developed by Taylor (1947) emphasized scientific management for organizational productivity. The human relations approach begun by Mayo (1933) considered human social factors as significant for meeting the organizational goals. Behavioral scientists sought to reconcile both theories.

Bandura (1997) showed that children’s competence beliefs relate to and predict their achievement in different school subjects such as math and reading (Baker, Dreher, & Guthrie, 2000). Overall, extrinsic motivation can be a catalyst in engaging one into task (Wigfield, Guthrie, Tonks & Perencevich 2004). It is important for teachers to realize that motivation is multifaceted and there are many different aspects to motivation.

Descartes was (1649) the first philosopher who developed a theory of behavior. He held that behavior can be explained in terms of physical forces acting upon the organism.

Atkinson (1964) defined motivation as “the arousal of tendency to act to produce one or more effects.”

Keller (1983) identifies four categories of motivation in learning situations: attention, relevance, confidence and satisfaction (ARCS) to ensure successful training.

The Oxford Dictionary (2006) defined motive which as “that which moves or induces a person to act in a certain way.”
Motivation forms a central construct of theories of learning. It is a hypothetical concept representing physiological and psychological processes (Valler and Thrill, 1993).

This is a complex hypothetical construct linked to that of attitude in that motivation implies intentionality and serves as the base for the interface area between subject proactiveness, inertia or withdrawal. In the field of learning, motivation is linked to the concept of autonomy since proactiveness implies the subject’s ability to conduct a contextual analysis, set a goal and determine steps and methods for achieving this goal (Atkinson et. al 1974). Over the years many psychologists have attempted to define and categorise what motivates people.

1. **Joe Kelly** (*How Managers Manage*) presents a simple model that illustrates the process of motivation.

**Needs – drives – behaviour – goals – reduction or release of tension**

Behaviour is both directed to, and results from, unsatisfied needs. The word unsatisfied is most important. As Maslow says,

“Well if we are interested in what actually motivates us and not what has or will, or might motivate us, then a satisfied need is not a motivator.”

Kelly’s model of motivation presents a sort of chicken-egg dilemma. Which comes first, the goal or the need? When we talk about behavior being goal-oriented, we mean that individuals feel a need, want, desire or drive to do something that leads to the achievement of a goal. But is the goal, as part of the self, already there? Is it the factor that stimulates the need? Are goals and needs the same thing?

It is useful to separate the two concepts. We can define a goal as that outcome which we strive to attain in order to satisfy certain needs. The goal is the end result, the need the driving force that spurs us towards that result. A student might have a goal to get an A in a course, but this goal may reflect a number of different needs. He or she may feel a need to confirm his or her competence; friends may all be getting A’s; he or she may wish to have the esteem of others; simply to do the best possible: to keep a scholarship. It is difficult to infer needs from goals.
We talk about money as a motivator. Money represents so many different things to different people that saying that individuals “work for money” is meaningless. What we have to know is what needs the money is satisfying. Is it survival, status, belonging, achievement, a convenient scorecard for performance? Remember, behavior is both directed to, and results from, unsatisfied needs.

Every individual has a number of needs which vie for satisfaction. How do we choose between these competing forces? Do we try to satisfy them all? Much like a small child in a candy store, faced with the dilemma of spending his or her allowance, we are forced to decide what we want the most; that is; we satisfy the strongest need first.

It will be more cleared by the next theory.

1. **Hierarchy of Needs – Abraham Maslow**

One model of motivation that has gained a lot of attention, but not complete acceptance, has been put forward by Abraham Maslow. Maslow’s theory argues that individuals are motivated to satisfy a number of different kinds of needs, some of which are more powerful than others (or to use the psychological jargon, are more prepotent than others). The term prepotency refers to the idea that some needs are felt as being more pressing than others. Maslow argues that until these most pressing needs are satisfied, other needs have little effect on an individual’s behavior. In other words, we satisfy the most proponent needs first and then progress to the less pressing ones. As one need becomes satisfied, and therefore less important to us, other needs loom up and become motivators of our behavior.

Maslow represents this prepotency of needs as a hierarchy. The most prepotent needs are shown at the bottom of the ladder, with prepotency decreasing as one progresses upwards.

**-SELF-ACTUALISATION** – reaching your maximum potential, doing you own best thing

**-ESTEEM** – respect from others, self-respect, recognition

**-BELONGING** – affiliation, acceptance, being part of something

**SAFETY** – physical safety, psychological security
PHYSIOLOGICAL – hunger, thirst, sex, rest

2. Dual-Factor Theory – Frederick Herzberg

Frederick Herzberg and his associates began their research into motivation during the 1950’s, examining the models and assumptions of Maslow and others. The result of this work was the formulation of what Herzberg termed the Motivation-Hygiene Theory (M-H). The basic hypotheses of this theory are that:

1. There are two types of motivators, one type which results in satisfaction with the job, and the other which merely prevents dissatisfaction. The two types are quite separate and distinct from one another. Herzberg called the factors which result in job satisfaction motivators and those that simply prevented dissatisfaction hygienes.

2. The factors that lead to job satisfaction (the motivators) are:
   - achievement
   - recognition
   - work itself
   - responsibility
   - advancement

3. The factors which may prevent dissatisfaction (the hygiene) are:
   - company policy and administration
   - working conditions
   - supervision
   - interpersonal relations
   - money
   - status
   - security

3. Achievement Motivation Theory

The achievement motivation theory evolved from the work of Murray (1938). Murray developed the idea on need as a construct. The construct of need according to Murray, is a force in the brain region which organizes perceptions, apperception, intellection, conation and action so as to create a unidirectional unsatisfying situation, which gives rise to certain overt behavior
intended to create a situation which stills the organism. (pp. 123-124) This achievement need was one of twenty developed by Murray. Murray developed the Thematic Apperception Test (TAT), published in 1938, an instrument for systematically measuring human motives (McClelland, p.43, 1987). Murray's TAT basically is built on Freud's technique of free associations and inferences for analysis of the resulting “day-dreams”. The TAT illicits imaginative stories from subjects after viewing a series of 20 pictures, suggestive of key emotional complexes in the life of the individual.

4. **Path Goal Theory**

Hoy and Miskel (1991) give Locke and his associates credit for development of the goal theory (p. 185). “The basic postulate of the theory is that intentions to achieve a goal constitute the primary motivating force behind work behavior. Goals direct both mental and physical actions of individuals” (Hoy & Miskel, 1991. p. 186). Four generalizations of the goal theory grew out of both laboratory and field studies: 1) specific performance goals elicit a higher level of performance than do general goals, 2) difficult goals, if accepted, result in higher levels of performance than easy goals, 3) subordinate participation in goal-setting activities, as opposed to goal setting by the supervisor alone, leads to employee satisfaction and commitment to the goals, 4) goal setting and feedback combine to enhance employee motivation.

1.13 **Computer Competence**

Computer training or competence is considered as essential contributor for organizational success in this Information age success. Computer competence skills include the ability to understand and/or use computer applications, to name and describe the typical digital computer components and their functions, to describe common computer applications and related social and ethical problems/impacts, to learning fundamental operations and concepts of work processing, spreadsheet, and/or database software applications.

Hefzallah (1999) categorized literacy into three categories: Visual, Media and Computer. Visual literacy is the ability to understand visual messages created by others. Media literacy helps to shape our thinking.
attitude and the information we possess etc through various media. Computer literacy, devastating as well as the lasting tool among modern technologies, is the handling of knowledge through computers. To say it otherwise he is talking about computer competency.

Summers et al. (1990) in their study on ‘New student teachers’ and computers: an investigation of experiences and feelings’ supported many previous findings. The majority of respondents reported having little or no competence in handling most of the computer functions needed by the educators.

1.14 COMPUTER ANXIETY

Scientific and technological progress all over the globe has made man more sensitive, critical and creative. Associated with this is growth of stress and anxiety. The term ‘anxiety’ has become part of our daily vocabulary. A person may be anxious for anything for studies, career promotion, personal life etc. Anxiety may be due to machines like computers, and then we call it computer anxiety.

Much attention has been given to the psychological construct computer anxiety as a predictor of successful or effective use by individuals. In educational institutions computer anxiety is the matter of concern because it reduces performance. Due to computer anxiety, many people are left behind in technological quest. (Havelka, 2004.)

The stress/anxiety felt by student/teacher with the necessity of using a computer in a learning or performance context could vary depending on their degree of computer literacy, the latter itself possibly being linked to whether or not the student has had prior access to a personal computer and for what length of time. The tension while dealing with computers is called with different names like computer anxiety, technostress, technophobia etc. Anxiety, by definition, is intense dread, apprehension or nagging worry.

There are many definitions of computer anxiety; but researchers haven’t agreed upon any standardized one.

Herdman (1983) defined computer anxiety as emotional fear, apprehension and phobia felt by individuals towards interaction with computers or even when they think of using computers.
The classic definition of technostress by Brod (1984), who defines it as "a modern disease of adaptation caused by an inability to cope with the new computer technologies in a healthy manner. It manifests itself in two distinct and related ways: in the struggle to accept computer technology, and in more form of over identification with computer technology."

Stone et al. (1996) concluded that computer anxiety is a psychological construct that is related to, but distinct from self-efficacy.

The construct of anxiety being new in this field, principal advancements are occurring in the domain of development of valid and reliable instrument of measure and evaluation (Chappell and Taylor, 1997, Potosky and Bobko, 1998 Yaghi, 1997).

Oxford Dictionary (2007) ‘Anxiety is the state of being in doubt, fear or nervousness’.

Maurer & Simonson (1984) has divided computer anxiety into different behavioral dimensions
a) Avoidance of computers and the areas where computers are located.
b) Excessive caution while using computers.
c) Negative remarks about computers and
d) Attempts to cut short the usage of computers.

Cambre & Cook (1985) stated that it was brought by the rapidly changing nature of technology and the subsequent pressure for social change. Howard & Smith (1986) defined computer anxiety as “the tendency of a particular person to experience a level of uneasiness over his or her impending use of a computer. Computer anxiety as defined by Howard, Murphy and Thomas (1986) is the “fear of impending interaction with a computer that is disproportionate to the actual threat presented by computer”.

Howard & Smith (1986) proposed sources of computer anxiety as
a) Lack of operational experience with computers
b) Inadequate knowledge about computers.
c) Psychological makeup

It is defined as different from negative attitudes toward computers that entails beliefs and feelings about computers rather than one’s emotional reaction towards using computers (Heinssen et al. 1987)
Rosen and Weil (1987) explained that three are levels of Technophobia:

**Anxious Technophobe**: Exhibits the classic signs of an anxiety reaction when using technology: sweaty palms, heart palpitations, headaches.

**Cognitive Technophobe**: On the surface is Calm and relaxed, but internally seethes with negative messages “I'll hit the wrong button and mess this machine up!”

**Uncomfortable user**: May be slightly anxious or use some negative statements, but generally not in need of one to one counselling.

Marcoulides and Wang (1990) further categorized computer anxiety as general computer anxiety and equipment anxiety.

McInerney & McIerne ,Sinclair  (994), on the other hand characterized four components of computer anxiety. These are

i) Learning Anxiety

ii) Computer Equipment Anxiety

iii) Computer observing Anxiety

iv) Computer Message Anxiety

Referring to the **Behaviorist learning approaches**, anxiety is a conditioned response. Feeling anxious and stressed may involve all kinds of learning-**Classical, Operant, and Cognitive**.

The old conception of **Classical** conditioning was that an association was learned when CS (conditioned Stimulus) and an UCS (Unconditioned Stimulus) were paired together several times. That's the essence of Classical conditioning. Many people who had been hurt in certain situations, like auto accident or climbing on something or doing an adventure, later on develop fear. However, classical conditioning in human beings is far more complex than just pairing a neutral stimulus (CS) with a situation that is unconditional stimulus (UCS) that automatically arouses a reaction. It is believed that CS arouses expectancies about the UCS (actually one develops mental representation of the UCS and then develops different reactions of the UCS), which of course, influences the final conditional response. Clearly a lot of mental events influence CS-UCS connection.

In **Operant Conditioning** learning theories stress, fear and anxiety development involves more of negative reinforcement. If one runs away fear and/or avoids fearful situation, fears are self developing. The possibility that
running away from fear strengthens it even more. It has important implications. Every time while dealing with a machine like computer, one is unclear about something but decides not to ask about it or not to use the machine in future or not to touch this matter again. One is discouraged and learns to be afraid of. Avoiding fearful situations may reinforce it again and again and build fears, anxiety and stress.

According to Cognitive Learning Theory, both unreasonable and reasonable fears (phobias) are based on thoughts. Of course it is a logical thought. That enables us to distinguish between rational fears and irrational fears, but for a frightened person it is difficult to distinguish. Yet one’s survival depends upon cognition- recognizing real dangers like drinking while driving or smoking while sleeping in bed.

Richard S. Lazarus (1984) believes that stress and primarily arise when one believes that he/she can’t handle the approaching problem. Obviously involves an appraisal of nature and seriousness of threat in comparison to the kind and Strength of coping mechanisms we think we are capable of.

As regards to Psychoanalytic theory, Freud theorized that birth was the first anxious experience in an individual’s life. Hence anxiety is rooted in the structural and organizational aspects of personality. His explanation started with an infant innately driven by its “Id” to eat, to eliminate, to be comfortable, to be held, to be loved, to be touched and have sensual stimulation. If these needs are not met, the child experiences anxiety. To meet sexual needs and to relieve anxiety, a part of the child’s personality that is thinking, reasoning, perceiving, self–controlling part called “ego”. The “ego” devises many ways for coping to become unusually close and dependent on one parent-a daddy’s girl or mummy’s boy. Or it may become sickly to gain attention. All these help one to be less scared. As an adult, ego is still handling neurotic anxiety by using defense mechanisms and by developing fears and phobias. All these neurotic symptoms help control or make up for the basic anxiety of getting the love, security and sensual touching we need. Part of the process of identifying with the same sex parent is the internalization of values, the development of conscience which Freud called “super ego”. The “Super ego”, the part that many people considered wicked-
the Oedipus or Electra complex. Because one, as young, could have known the birth trauma, overwhelming the fear and sense of utter helplessness. Because one wants love so desperately that one handles one’s fears by developing at about age of five or six, a set of rules to live by that will help his/her become good boy or good girl. All the “shoulds’ come from super ego part of personality.

Freud saw anxiety as a signal of danger such as threat of childhood memories, urges and fantasies coming into our consciousness or actually being carried out. Events that happen to the people as adults might set off an old repressed urge. Immediately one becomes anxious often without knowing why. One develops defense mechanisms to prevent anxiety, to keep safe the hidden “true” causes of childhood memories, urges and shames. In short, irrational adult fears and phobias are neurotic ways of continuing cope with childhood traumas. These are manifestations of our earliest fears, conflicts and anxiety.

To sum up, anxiety can be defined as the level of bio-social-psycho-physiological responses of an individual make to either a given event or culmination to life events. The severity of their response is in direct relation to firstly how distressing or threatening one perceives these events and subsequently ability to cope with. How an individual responds to given event depends upon a complex interplay of biological, effective, cognitive or behavioral responses.

Goel & Goel in their article “The stumbling blocks in the cyber café odyssey (2003)” used an analogy of an ‘earthen pot’ (the substance of a cyber café) which has a broad face (the vast scope of ICT), greater storage capacity (the digital capacity), a relatively small base (the computer) and a highly delicate ambience (a stroke of stone can break a pot and so is the computer virus). For the proper use of pot to quench our thirst, we have to be very sensitive to its requirements, because this is where the problem lies.

For the purpose of this study Computer anxiety has been taken as conceptualized by Heinssen (1987). It is defined as different from negative attitudes toward computers that entails beliefs and feelings about computers rather than one’s emotional reaction towards using computers (Heinssen, Glass and Knight, 1987).