# UNIT 3: ROLE OF ICT IN EDUCATION

## UNIT STRUCTURE



## 3.1 LEARNING OBJECTIVES

After going through this unit you will be able to -

- explain the meaning and concept of ICT
- describe the impact of ICT on education and
- discuss the use of ICT on classroom based education.

## 3.2 INTRODUCTION

As you know, technology has dramatically changed our society and has even changed the way we communicate and interact with each other. It has impacted every facet of our life so profoundly that we cannot imagine our lives without it. Computers, the Internet, digital cameras, MP3 players, cell phones, smart phones and personal digital assistants (PDAs) are just some of the technological advances we use every day. These Information and communication technologies (ICT) have also become important tools for delivering education around the world. As teachers we need to be familiar with ICT, only then we will be able to prepare students of elementary level for life in the 'digital age' and empower them to learn, live, and work successfully today and tomorrow.

In this unit we will be be discussing the meaning and concept of ICT. We will also discuss the impact of ICT on education and how ICT has impacted classroom based education.

We hope that this unit would be of particular interest to you as it will adequately prepare you to visualize how to integrate technology into your daily school routine and develop a "thinking with technology" perspective.

## 3.3 MEANING AND CONCEPT OF ICT

You definitely must have heard or read about ICT. But what does it mean? ICT is an **acronym** that stands for Information and Communication Technologies. ICT is an umbrella term used to include all those technologies that are being used for communication, data delivery, data processing and data storage. Computers are appropriately classified under ICT. However, the beginning of ICT can be traced to the invention of the printing press in Germany by Gutenberg in 1450. It is regarded as the most remarkable invention as it brought about a revolution in communicating to the masses.Printing made it possible to preserve and transmit information to the masses. Even today after several centuries the printed text is still regarded as one of the major medium of storing and imparting information and knowledge. However it is in the 1980s that computers have emerged as an alternative of the printed text and have made it possible to store large quantities of material in textual as well audio visual form that can be used and modified and reused as and when required.

***Acronym*** **-** A word formed by using the initials of a phrase or other groups of words.

In fact the 20th century has witnessed the birth of many other communication technologies such as radio, which made it possible to record the spoken word and transmit it over a distance. Then came the television that made it possible to record and transmit audio-visual (moving images). ICT have proved to be a powerful tool for extending educational opportunities in formal classroom based settings and increasing the scope of offering education at a distance. Thus giving fillip to the evolving distance education system. Computers and computer networks have enabled us to transcend both time and space and have made it possible to both teach and learn online (via a networked computer)and access learning materials on any

subject and in a variety of media (text, audio, video) anywhere and anytime; connect with real people and to participate in real world activities and events irrespective of location.It has also facilitated access to teachers, resource persons, experts, counsellors, researchers, peers etc. located anywhere in the world.

Therefore besides computers and computer networks (the Internet) ICT also includes radio, television, satellites, telephones, cell phones, print technology and all other technology invented for the purpose of communication, data delivery, data processing and storage.

**CHECK YOUR PROGRESS**

**Q 1:** What is the meaning of ICT? Name 5 technologies that can be listed under ICT. Write your answer in about 50 words.

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## 3.4 IMPACT OF ICT ON EDUCATION

As we know human beings have from the very beginning tried to gain control and mastery over nature and natural resources and thereby adapt to their natural environments. The human species' use of technology began with the conversion of natural resources into simple tools. The invention of the wheel helped humans in travelling in and controlling their environment. The invention of the printing press made it possible to communicate with people distant in both time and space. Recent technological developments, like the telephone, and the Internet, have lessened physical barriers to communication and allowed humans to interact freely on a global scale.The rapid advancements in telecommunications, wireless communications and computer technology has enabled the

communication of ideas and commands to machines. In other words technology has been developed to make life easier.

The information given in Table 3.1 will give you an overview of the adoption of technology in the education and how it has brought about changes in the methods of teaching and learning. The invention of the blackboard brought about the transition from word of mouth system to chalk and talk method of teaching and learning. However, the major transformation came with the invention of printing which made it possible to record and transmit information in printed form and this reduced the total dependence on word of mouth method of instruction. Books became a major medium of instruction that not only reduced the hegemony of the teachers as the givers of knowledge as books flooded the market but also contributed to the development of the distance education system.

**Table 3.1-** Instructional Technology Time Line: An International Perspective

| |
|---|
| 1600s Public Education – founding of first public schools in the US |
| 1700s Blackboard |
| 1800s Books |
| 1840s Portal system (correspondence education) |
| 1920s Radio, Motion Pictures |
| 1930s Film strips Projectors |
| 1940s Overhead Projectors (Slides) |
| 1950s Gramophone; Overhead Projectors |
| 1960s Television; Language Labs; Chalkboards; Calculators |
| 1970s Video Cassette Recorders |
| 1980s Audio Cassette Recorders; Desktop Publishing, Audio Conferencing, Teleconferencing |
| 1990s Computers; CD Rom players; Internet; World Wide Web; Google; Smart Board Interactive White Boards; DVDs , Videoconferencing, Computer conferencing |
| 2000s Laptops; Online Learning; Mobile phones; Smart phones; LCD & LEDs; Wikipedia; You tube; IPods; Webcasting; Electronic Textbooks; I pads |

*(Compiled by the author. Source: http://www.isrl.illinois.edu/~chip/projects/*

*timeline.shtml)*

It is often said that two technological inventions gave birth to Distance Education (DE), namely the printing press and the postal system. Printed notes were sent by post to the learners and thus Correspondence Education was born. Its origin can be traced to the 1840s to UK where Sir Issac Pitman came up with the ignominious idea of delivering instruction (his Short hand notes) through penny post. Thus DE originated in the private sector as a means to provide teaching service to home-based students. Within a few decades (by the end of the 19th century) private correspondence colleges were established in many European countries, the USA and Canada.

In the post second world war period, DE emerged as a viable alternative to meet the enormous demand for access to formal education all over the world. Today there are around 100 Open Universities, several online virtual universities and dual mode universities and institutions exclusively offering DE.

However, the use of technology in education specially designed to enhance students learning and making the school environment a place where students will want to learn, emerged for the first time as a movement in instructional technology in the 20th century particularly during the Second World War period. America's victory at war (Second World War) is attributed to the use of audio- visual devices for military training. It is often quoted that it took 38 years for radio to reach the people, 13 years for television and just 4 years for the Internet. Hence in the late 1920s and mainly in the 1930s radio broadcasting began to be used for educational purposes and brought about the transition from visual to audio-visual by making use of sound effects and dramatizations to compel learners to listen and get involved in the lesson being delivered, as prior to that silent motion pictures were used. Thereafter, the use of television in the field of education had a greater impact than radio because of its capacity to combine text, sound and moving images to provide authentic content. Both radio and TV broadcasts have been in educational settings either as substitutes for teachers temporarily or as supplementary or complementary teaching or as general education programmes for the public at large basically for their enrichment. With the introduction of satellites

both radio and television became two way interactive media. Teleconferencing is used in both formal and non-formal learning contexts to facilitate teacher-learner and learner-learner discussions, as well as to access experts and other resource persons remotely located elsewhere at different places.

**CHECK YOUR PROGRESS**

**Q 2:** Which two technologies gave birth to distance education and in which country?

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An American educationist who made several contributions to audio and visual instruction, including a methodology for analyzing the content of motion pictures was Edgar Dale, often cited as the father of modern media in education. He developed from his experience in teaching and his observations of learners the "cone of experience" (see Figure 3.1) which is a visual metaphor of learning experiences, in which the various types of audio-visual materials are arranged in the order of increasing abstractness as one proceeds from direct experiences to indirect and the more sensory channels possible in interacting with a resource, the better the chance that many students can learn from it (Dale,1946).The cone's utility in selecting instructional resources and activities is relevant today also. As per Dale's cone of experience, the more real life experiences, whether it is done through technological interventions or direct real experiences through actual field trips or live demonstrations, would make the learner able to analyze, design, create and evaluate the content and reduce the degree of abstraction that purely textbook based knowledge would provide.

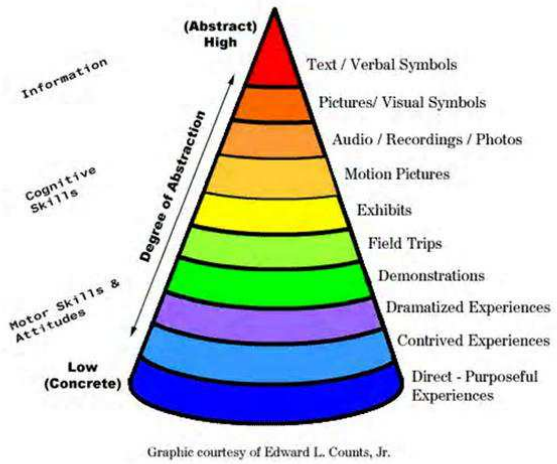


**Figure 3.1 - Dale's Cone of Experience**

With the introduction of computers arose computer aided instruction (CAI) and subsequently computer based learning (CBL). CAI was used in elementary schools for drill and practice and CBL in secondary schools for developing computer related skills such as word processing etc. With the advent of networked computers with Internet access has increased the challenge of using technology in classrooms.

The awesome power of the Internet has made it possible to move massive amounts of data in different forms i.e. text, audio, video, graphics, animation etc. at a very high speed on the computer screen of a learner, any time (24 x 7) and anywhere. Also it has also made it possible to take a virtual tour of any place in the world and participate in lectures, view films or visuals in the form of graphics, photographs etc. and animation i.e. (providing visual illusion) motion to inanimate objects, and simulations that are reality based. Simulations are particularly useful in situations that are not easily accessible or where damage to equipment property or self is possible without the high risk and cost experienced on the job. For example, teaching the safe handling of toxic or explosive chemicals or visit to Antarctica which is quite impossible, etc.

ICTs can enhance the quality of education in several ways: by enabling new ways of teaching and learning that is technology based education rather

than simply allowing teachers to promote rote learning through chalk and talk methods. Thus bringing about a shift from the teacher centred method of the teaching learning to learner centred methods. ICTs such as videos, television and multimedia that combine text, sound, and colourful, moving images can be used to provide challenging and authentic content that will engage the learner in the learning process. More so than any other type of ICT, networked computers with Internet connectivity can increase learner motivation as it combines the media richness and interactivity of other ICTs with the opportunity to connect with real people and to participate in real world events. Learners discover the meaning of what they learn by engaging themselves in obtaining knowledge from variety of media including the teacher, interacting with peers and teachers; working together to solve complex, real-world problems, rather than being taught facts from books. ICT-enhanced learning is student-directed and diagnostic. Unlike static, text- or print-based educational technologies, ICTs allow learners to explore and discover rather than merely listen and remember. All this in turn leads to the development of analytical thinking and critical skills that they must possess to meet the demands of the 21st century (Tinio, 2003).

We will discuss the various ICT options available to teachers to make classroom based education more engaging, motivating and effective for the learners. In the sub section given below i.e. 3.4.1 we shall be discussing this in detail.

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### 3.4.1 Classroom Based Education

As teachers we generally stick to the contents of the textbook, which may or may not be updated, while teaching in the classroom. We are used to using the blackboard to explain a topic. The use of ICT in the classroom can bring about a transformation in the pedagogy or the science of teaching itself, from teacher centred pedagogy to learner centred pedagogy; from passive memorization based learning to active learning. You should know how ICT can be used in classrooms for presentation of content, demonstration, drill and

practice and interaction. Table 3.2 demonstrates how technology stimulates the learner and gets the learner involved in the learning process.

You should be able to use ICT to stimulate your students and involve them in real life situations through TV/radio/networked computers etc. and provide a platform for them for further inquiry, analysis, interaction, and the scope for construction of new knowledge. You can also build their teaming and communication skills by promoting collaborative learning environments.

**Table 3.2 - Technology vs. Domains of Learning**

| | |
|---|---|
| Books are an extension of BRAIN |  |
| Video is an extension of EYE |  |
| Audio is an extension of EAR |  |
| Audio Conference is the extension of MIND & VOCAL CHORD |  |
| Computer is an extension of Fusion of MIND, HANDS & EYES |  |
| Satellite Technology is an extension of HUMAN REACH |  |
| Computer Network is an extension of HUMAN CO-OPERATION |  |

*Source: Developed by Saxena (2008):Based/Inspired by the famous DAEWOO ad. by Marshall Macbun)*

The following technological tools are must have for the classroom of today. Each tool provides teachers with a method to actively engage their students in the learning process which have been listed below-(http(http://teaching.about.com/od/tech/a/Technology-In-The-Classroom.htm):

**A computer with an Internet connection.** The Internet is arguably the greatest technological invention of all time. There are

so many potential educational uses of the Internet that it is virtually impossible for a single teacher to use all of them. Using the Internet, you can engage your learners in a curriculum related activity. As teachers you should surf the World Wide Web (WWW) by using a search engine like Google for websites that are relevant to the course you are teaching and match the level of your students.

You can then use the information obtained for presentation of content. You can also use information and resources available on the WWW such encyclopedia, atlases, virtual laboratories, musical compositions, films, visualizations and graphical presentations etc. to enrich your lecture session. A few well known Visualization Tools available on the Internet have been given below in **Box 3.1**.

You can also create a class website where you can post your students profiles, their work and performance, homework/ assignments, schedules, important information etc. This can be made interactive by asking the students and their parents to be in regular contact through e-mails. Students can be asked to submit their homework and assignments online. Parents can update themselves about the latest developments and activities of the school through the school website and about the class from the class website. To create your class website you may look at Classroomupdate.com (a simple online teacher website creation tool) at http://www.superteachertools.com

You can also take your students onto voyages and adventures into realms that would not otherwise be possible. National Geographic Kids (web address: http://kids.nationalgeographic.com/ kids/); Science Kids (web address: http://www.sciencekids.co.nz/ gamesactivities.html) are some educative links for you to explore.

The market is flooded with CD ROMs specially developed for Schools targeting all levels from Kindergarten to Class XII that can be used by the Teacher on his/her computer. For example, programmes are available on how to teach Kindergarten children, how to read, spell and pronounce words. Also step by step lesson

plans are available with complete content specially prepared using interactive activities and games, readymade tests for evaluation. Specially designed computer based packages are also available to teachers for various sports.

**An LCD projector is must in a classroom**. It is a powerful tool, because it allows the information appearing on the computer monitor to be projected in a classroom for the benefit of large group setting making the matter visible to all on the large screen.

**A document camera** works in conjunction with your LCD projector. A document camera essentially has taken the place of the old overhead projectors. With a document camera, you no longer need transparencies. You simply put the document you want to show your students under the camera and it is shot up on the screen through your LCD projector. Once it is up on the screen you can use the camera to take a screen shot of the document and save it directly to your computer for later or you can just use the live version.

**Box: 3.1 Examples of Visualization Tools**

Geographic Information Systems (GIS) that allows users to capture, analyse and display geographically referenced information; Gapminder.com that presents statistical data graphically dynamic ways; JMOL that allows users to view the chemical structure of molecules in 3-D; Google Earth that allows users to view geographical space from different angles and distances through the use of superimposed satellite imagery. You Tube allows you to discover, watch, upload and share videos.

(*Source:http://teaching.about.com/od/tech/a/Technology-In-The-Classroom.htm)*

**A smart board(digital whiteboard)** is taking the place of a traditional black board or white board. It is essentially a white board with technological capabilities that provides touch control of computer application. Teachers can create engaging, active lessons using the many tools that a smart board provides such as transposing diagrams, charts, and three dimensional audio video images.

Students can also come up and actively participate in the lesson by answering question by using a hand held device and then print anything such as notes from the smart board as instructional handouts.

**Digital camera** can also be used by you as digital cameras also have video capabilities. You can capture images on your digital camera and project it via the computer and LCD projector in the classroom.

You would have realized that when technology is used within the four walls of a classroom to supplement classroom teaching the walls become permeable. As a teacher of the 21st century you must be adept in using 21st century tools that we have listed above. You should be able to harness the power of technology to make the teaching learning experience more effective and enjoyable. An example will probably convince you. When you are teaching say the poems of William Wordsworth and describe the poetry of Wordsworth who was basically a nature poet and who lived in the Lake District of Scotland which is known for its natural beauty, your lecture can only create that image in the minds of the learners. While providing the above instruction you have several options before you: you can take your students on a virtual tour of the Lake district of Scotland and also a live recitation of the poems in the form of an audio clip that could have a powerful impact on the learners learning as they will be able to discern significant semantic features not obvious in a written transcript. You will agree with us that simply lectures or text alone does not give the learners the actual "feel" of Wordsworth and his works, whereas e-content delivered through audio, video, animations etc. can provide the learners with a multi sensory perspective of the subject and they can in turn experience their subject in a vicarious manner, which is undoubtedly very enriching and rewarding. The key design of such materials lies in semantically connecting the multimedia into a map and not a random presentation of information.Thus students will become active

participants, and the knowledge dimension that moves from factual level of knowledge to the meta-cognitive level. This is essentially a movement from providing basic facts to real learning experiences that are engaging and motivating and that are bound to leave an impression that will last for a long time.

**CHECK YOUR PROGRESS**

**Q 3:** List three technologies that can be used in the classroom to make teaching learning more effective and enjoyable.

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However, the experience of introducing different ICTs in the classroom and other educational settings all over the world over the past several decades suggests that the full realization of the potential educational benefits of ICTs is not automatic. The effective integration of ICTs into the educational system is a complex, multifaceted process that involves not just technology indeed, given enough initial capital, getting the technology is the easiest part, but also curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing, among others.

However, as teacher you are the best judge to decide on the materials and resources that can to be used to meet learners' needs, whether it involves technology or not. Learners' needs should be the driving force behind a lesson, not the "need" to show off a "new" technology tool. As teacher you need to be exposed to a variety of technology tools so that you can choose which one best fits with the educational lesson being taught.

## 3.5 LET US SUM UP

In this unit we have discussed the following matter -

- We have gone through the meaning and concept of ICT and how ICT

has facilitated communication between individuals or groups who are not physically present at the same location. ICT includes radio, TV satellite, telephones, cell phones, print technology, computers, internet and all other technology invented for the purpose of communication, data delivery, data processing and storage.

- We have also discussed the impact of ICT on education. We have explained how ICT has enhanced the quality of education in several ways; enabling new ways of teaching and learning that has brought about a shift from the teacher centred methods to learner centred methods of teaching. Unlike text book based education, ICTs allow learners to explore and discover rather than merely listen and remember.
- You have also been exposed to various ICT options that you could use in your classroom in order to actively engage your learners in the learning process and prepare the students of the elementary level for life in the digital age.

## 3.6 FURTHER READING

1) Rumble, G. (1989) The role of distance education in national and international development: An Overview, Distance Education, 10 (10), 83-107.

2) Taylor, J.C. (2000) New millennium distance education, In Venugopal Reddy & Manjulika S. (Eds). The World of Open and Distance Learning, New Delhi: Viva Books Pvt Ltd. P477-482.

## 3.7 ANSWERS TO CHECK YOUR PROGRESS

**Ans to Q No 1:** ICT is an acronym that stands for Information and Communication Technologies. ICT is a comprehensive term which

includes in it all those technologies which are being used for communication, data delivery, data processing and data storage.

Name of technologies that can be listed under ICT are: radio, television, telephones, cell phones and computers.

**Ans to Q No 2:** The Printing press and the Postal system are the two technologies which gave birth to distance education in UK.

**Ans to Q No 3:** (1) Computer with Internet connection

(2) LCD projector

(3) Document camera

## 3.8 MODEL QUESTIONS

**A) Very Short Question**

**Q 1:** What does ICT stand for?

**Q 2:** Which technological invention has brought about a revolutionary change in the area of mass communication and where was it invented?

**Q 3:** Name the technology which can record and transmit audio-visual texts or images?

**Q 4:** Who is regarded as the father of modern media in education?

**Q 5:** Mention some of the technological tools which should be present in a modern classroom.

**B) Short Question** (Answer in about 150 words)

**Q 1:** Explain the meaning and concept of ICT.

**Q 2:** Give two examples of the adoption of ICT in education that has brought a shift from teacher centric method to learner centric method of teaching.

**C) Long Question** (Answer in about 300-500 words)

**Q 1:** Discuss the impact of ICT on education.

**Q 2:** What are the various ICT options which you can use in your classroom in order to actively engage your students in the learning process? Explain with examples.

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