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# UNIT 12 ICTs FOR TEACHING AND LEARNING

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## 12.1 INTRODUCTION

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You may be aware of the use of different technologies such as radio, television, computer, etc., in the teaching-learning process. In fact, all these technologies have transformed the teaching and learning process. Radio, television and newer digital technologies such as computers and the Internet constitute Information and Communication Technologies,. They have been visualized as powerful enabling tools for educational changes. Different ICTs have potentiality to expand the access to education, strengthen the process of education and enhance the quality of education. The present unit is an attempt to give you a thorough understanding of these technologies as well as their utility in teaching- learning process.

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## 12.2 OBJECTIVES

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After going through the unit, you will be able to:

- explain the concept of Information Communication Technology;
- classify the ICTs according to their appropriate domain;

- identify appropriate ICTs for your classroom instructions;
- use various ICTs in teaching and learning; and
- motivate your students to use ICTs for up-gradation of their knowledge.

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## 12.3 WHAT IS ICT?

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IT and ICTs are very often interchangeably used in the context of modern technology infrastructure. ICT is a broad and comprehensive term, which comprises information technology and communication technology. Information technology includes radio, television, computer and internet, teleconferencing and mobile technology. All these information technologies are powered by mainly two types of communication technologies. These are satellite based communication and terrestrial based communication. Satellite based communication is the communication, which takes place between sender and receiver through a communication satellite whereas terrestrial based communication is the communication, which takes place through a network of transmitters spread across a geographical area, a country, or a state. This type of communication is used in the transmission of radio and television in India. However, with the launch of a series of satellites by Indian Space Research Organization (ISRO), satellite based communication is being used for telecommunication. The components of ICT are presented in Fig.12.1.

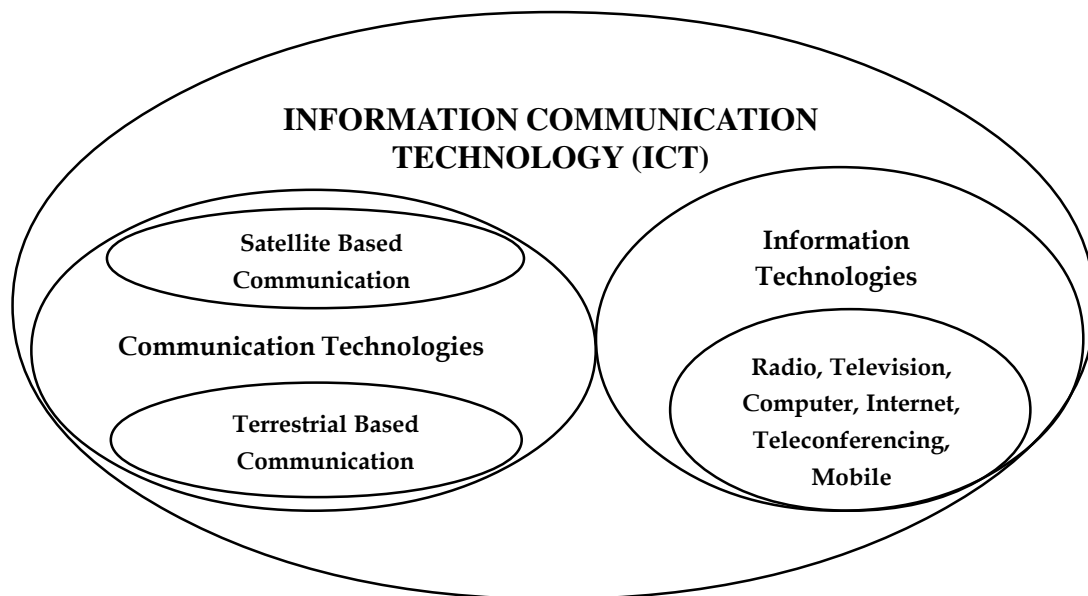


Fig.12.1: Components of ICT

Communicating information effectively by making use of appropriate technology is called information and communication technology (ICT). In all, ICT is an umbrella term that includes many communication devices such as radio, television, cellular phones, computers and network, satellite systems and so on. There are many definitions of ICT. ICTs are defined, as a “diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information.(Blurton, 2002)” These technologies include *computers, the Internet, broadcasting technologies (radio and television), and telephony, etc.*

According to the United Nations Development Programme (UNDP): “*ICTs are basically information handling tools — a varied set of goods, applications,*

*and services that are used to produce, store, process, distribute and exchange information. They include the “old” ICTs of radio, television and telephone, and the “new” ICTs of computers, satellites and wireless technology and the Internet. These different tools are now able to work together, and combine to form our “networked world”, a massive infrastructure of interconnected telephone services, standardized computer hardware, the Internet, radio and television, which reaches into every corner of the globe.”*

According to C-DEC, Department of Information Technology, Government of India *“the term, information and communication technologies (ICT), refers to forms of technology that are used to transmit, store, create, display, share or exchange information by electronic means. This broad definition of ICT includes such technologies as radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software; as well as the equipment and services associated with these technologies, such as videoconferencing, e-mail and blogs.”*

**Check Your Progress 1**

**Notes:** a) Write your answers in the space given below  
 b) Compare your answers with those given at the end of the Unit.

1) Explain the term ‘ICT’?  
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2) On the basis above discussion, enlist the technologies, which are included under ICT?  
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## **12.4 ICT FOR TEACHING AND LEARNING**

After providing an understanding of the concept of the ICT, we will explain the need of ICT for teaching and learning.

The ICTs are needed at school level for the following activities (Sansanwal, 2009):

- Teaching-learning
- Diagnostic Testing and Remedial teaching
- Evaluation activities

- Psychological analysis of learners
- Development of reasoning and thinking abilities among students
- Instructional material development

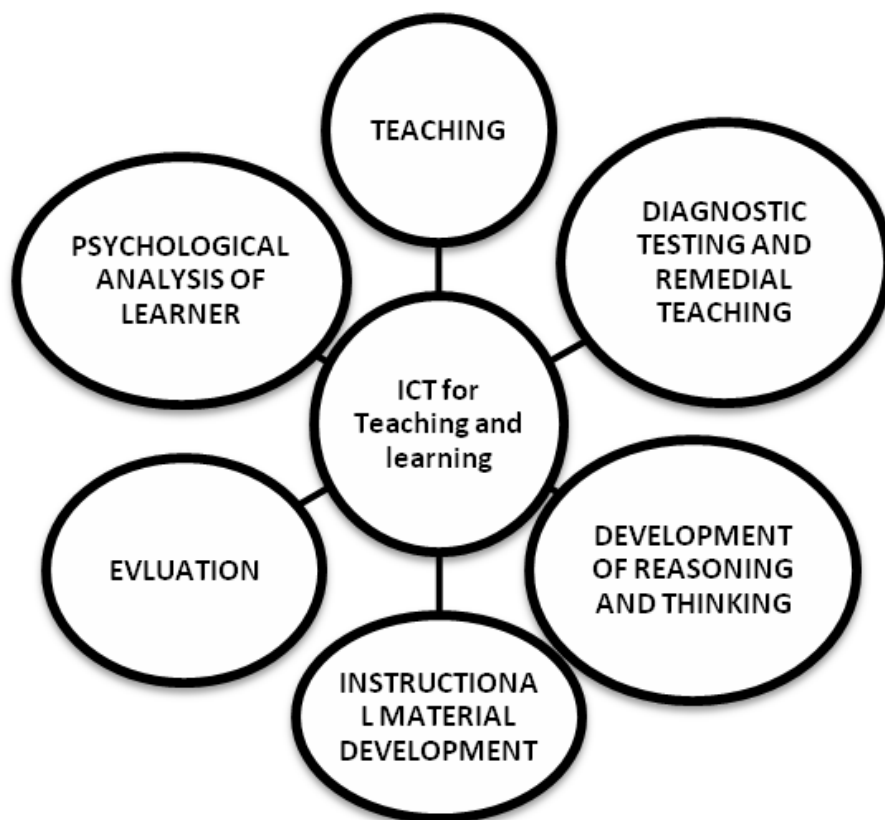


Fig.12.2: Need of ICT in Teaching and Learning Process

### 12.4.1 ICT in Teaching-Learning Process

Most teachers feel comfortable in using lecture method, which is not capable of achieving various objectives of classroom instruction. ICT may be of great use in achieving various objectives of teaching –learning process. It provides correct information in a comprehensive manner with different examples. It helps learners to broaden their information base. ICT provides variety in the presentation of content, which helps learners to learn according to their own pace. It helps in better understanding, and long retention of information.

### 12.4.2 ICT for Diagnostic Testing and Remedial Teaching

Being a teacher, you must have experienced that there are some students who fail to understand certain concepts or retain certain information for a long time. Due to large class size, non-availability of diagnostic tests in different subjects, lack of training, resources and desire on the part of teacher, etc. teachers do not conduct diagnostic tests and provide remedial teaching. Here ICT can help the teachers as well as students in identifying the problem area. Tests can be made available on the website of the school and students can access them from home also. These practices can be monitored by parents also. It is not easy to organize remedial programme for individual students as problems identified may be of varied nature. For this, ICT can be used for developing, preparing and delivering individual Remedial Programme. These programmes may be online or off-line.

The instructional materials, if designed specifically for meeting the individual needs of students, and are uploaded on the School website, would definitely benefit students. In this way, ICT can be used for providing remedial teaching to students.

### **12.4.3 ICT in Evaluation**

The objective of school examination system is to assess the academic performance of students. ICT can be used in educational evaluation. Online tests can be used by individual student to evaluate his/ her learning. Students can instantaneously get the feedback about the status of his/ her understanding. If the answer is wrong, he/ she even can get the correct answer. Not only students, even teachers, can also use it to assess their own understanding of the subject.

### **12.4.4 ICT in Psychological Testing**

There are individual differences. Schools do not have a trained psychologist who can assess students on some of the correlates of academic achievement. It is easy to digitalize all the psychological tests including the scoring process and evaluation. The same may be available on the website and students and teachers can use them, whenever required. Even student can use it individually and can share the results with the teacher who can help him/ her to improve his/ her academic performance. Thus ICT can be used in psychological testing also.

### **12.4.5 ICT for Developing Reasoning and Thinking Abilities Among Students**

ICT can be used in many subjects. ICT provides students a variety of instructional materials and they can choose those that suit them the best. ICT can be used for developing reasoning and thinking abilities among students belonging to different age groups. This is important in the present context as most educational institutions do not pay attention to development of reasoning and thinking abilities among students.

### **12.4.6 ICT for Developing Instructional Materials**

At present there is a shortage of qualified and competent teachers in almost all subjects at all levels. Sometimes, instructional materials available in the print form are not of quality and updated. The text book reading is very often not enjoyable and does not help students in understanding the concepts and retaining the information. There are many teachers who are well known in different subject areas. Their lectures should be recorded in CD-ROM, or should be made available to all the users through broadcast on radio and television. It enhances the quality of instruction in the classrooms. The teacher can also use them to organize discussion after their presentation or broadcast. Teachers can even directly download those lectures. It makes teaching effective, participatory and enjoyable. Digitalized lectures can be uploaded on websites and student teachers can access them as per their needs.

#### **Activity 1**

Enlist some activities using ICT, which you would like to plan for diagnostic testing of your students in your subject.

### Check Your Progress 2

- Notes:** a) Write your answers in the space given below  
b) Compare your answers with those given at the end of the Unit.

3) Discuss the uses of ICT in classroom teaching?

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4) Apart from areas discussed above, what are other areas, where you can use ICTs for improving teaching and learning?

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## 12.5 ICTS AND THEIR APPLICATIONS IN TEACHING AND LEARNING

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### 12.5.1 Radio

All of us know that radio is a very powerful medium for transmitting information to a large group of population. It saves time, energy, money and human resources in an effective way. Radio can be used as an effective tool in education both for formal and non-formal education.

Radio Technology was developed during the late nineteenth century and came into popular usage during the early twentieth century. The popularity, availability, and low cost of radio made it a convenient and practical medium for use in distance learning programmes. It is mostly used in combination with other media, such as with print medium followed by face-to face teaching. Educational use of radio started around 1930.

You must have listened to some educational programmes either on All India Radio or on FM channels. There are generally two types of programmes. Some programmes are informative or for entertainment purposes. Other programmes are educational in nature. These programmes are meant primarily for educational purposes. Let us understand the process, through which we can use radio programmes in our regular classrooms.

#### Using radio programmes in classroom

Radio programmes in classroom situation are very useful for teaching and learning. Now-a- days, Gyanvani (Radio Channel of IGNOU) and All India Radio

regularly broadcast many educational programmes. These programmes are both for teachers and students. Given in the Box-1 is highlights of a radio broadcast for class VII students. The topic of broadcast is our environment.

### Box 1: Highlights of a Radio Broadcast

**Subject: Social Science    Topic: Our Environment    Class: VII**

**Theme and major issues:**

In the radio lesson on the topic ‘Our Environment’, experts discussed about our environment. The discussion was focused on concept of environment, components of environment i.e. natural, and man-made.

Experts also discussed about biotic and a-biotic components, domains of environment i.e. atmosphere, biosphere, hydrosphere and lithosphere.

Their discussion also focused on eco-system. They concluded their discussion with man-made environment.

The discussion was full of examples from surroundings of children. Experts asked students to perform some activities after the broadcast. They also suggested some activities to be conducted by teachers in their classroom.

If you want to use this programme in your classroom, you have to plan properly in advance. The steps are explained to facilitate you for using radio broadcast in your class.

#### A) Preparing class for radio lesson:

- First of all, prepare yourself, your class and students for a radio class;
- Collect advance information of broadcast timing and topic from All India Radio or local radio station or from Gyanvani studio, which is going to broadcast this lesson;
- Provide students with the theme of the topic for broadcast in advance;
- Ask students to read the related topic in advance before coming for the radio class;
- Frame some objectives, questions and activities related to the topic, i. e. environment, in advance to facilitate the students;
- Arrange possible materials or prepare them to be used for demonstration during the broadcast, like you can prepare some charts representing components of environment and domains of the environment;
- Arrange a model of any eco-system like pool eco-system or forest eco-system;
- Draw a comparison table on blackboard, without filling it;
- Identify a proper place to keep the radio so as to ensure its audibility to all students. The seating arrangement should be in such a way so that all the students listen to the broadcast clearly; and
- Motivate your students to listen to the programme carefully and to take notes of important things being explained by the experts during the broadcast.

### A) Using radio in class

The second step is using the radio broadcast in class.

- Ensure that while broadcast is going on, there should be no distortion or noise in the classroom;
- Avoid discussion during the broadcast but remain attentive towards the broadcast content;
- Take notes of important points during the broadcast along with your students;
- Note down the instructions given for you by the experts;
- Experts may suggest many activities for you to be performed to explain the concept effectively and efficiently;
- If, it is a phone in programme, encourage your students to ask the experts questions related to the programme; and
- Develop an outline of the issues raised by the experts during the broadcast.

### B) Post broadcast follow-up

As soon as broadcast is over; you have to organize follow-up activities.

- Organize a discussion on the basis of the radio programme;
- Try to solve the queries and doubts noted down by students during the broadcast;
- Ask students the questions framed by you to ensure the achievement of instructional objectives;
- Ask students to perform some activities suggested during the radio broadcast or designed by you to ensure the understanding of concepts by the students; and
- Assign students some group projects like developing a model of ecosystem, various domains of environment, etc.

The effectiveness of radio class depends upon your preparedness, arrangement and also on broadcast quality. If you observe any technical difficulty or broadcasting error, you can communicate to the radio broadcasting agency so that in future, good quality radio broadcasting can be ensured.

### Benefits of Radio as an Educational Tool:

- 1) Radio has a greater value for weak students who benefit from radio as a supplementary learning tool.
- 2) Radio is more cost-effective and results in effective learning.
- 3) Radio has the advantage of teaching those subjects in which classroom teachers may have some problems or are not resourceful.
- 4) Radio broadcast provides recreation for students along with learning.
- 5) Radio broadcast is very effective tool of teaching in remote areas, where the teaching learning facilities are not enough.



- 6) Radio broadcast is equally helpful in enrichment of teachers' knowledge, which they might not be able to get due to lack of time and resources at their places.
- 7) Recordings of naturally occurring events, e.g. political speech, children talks, concerts or performances, talks previously recorded for others, eyewitness interviews at historical events, presenting material in a dramatized form, enabling students to identify with the emotions and viewpoints of the main participants; providing an alternative view to that presented in the correspondence text and/ or television programmes; and enabling students to perceive the different points of view that exist and observe ideas being challenged, through discussion and interviews, when broadcast through radio, help both teachers and students (Vyas, et.al. (2002).

### Check Your Progress 3

**Notes:** a) Write your answers in the space given below

b) Compare your answers with those given at the end of the Unit.

- 5) What are the classroom implications of educational broadcasting through radio?

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### Activity 2

Prepare a list of subjects, in which radio broadcasting is available in your region. Involve your students in one such programme and note down their experiences on it.

## 12.5.2 Television

Television is another important medium of disseminating information to its viewers. It is a combination of audio and visual technology, and thus considered to be more effective than audio media like radio. You must have seen the use of television for multiple purposes of entertainment, information and education. Because of its better accessibility, it can bring learning materials to the masses in more direct, effective and personal way than other educational media.

Television named as 'Doordarshan' started its service on Sept 15, 1959, as the National Television Network of India. In India, since the inception of TV network, television has been perceived as an efficient and effective medium of education and development. With its large audience it has been an efficient tool of imparting education to primary, secondary and university level students.

Some of the major educational television initiatives in India are Secondary School Television Project (1961), Satellite Instructional Television Experiment (SITE) (1975), Post-SITE Project (1977), Indian National Satellite Project (INSAT)

(1982), IGNOU-Doordarshan Telecast (1991), Gyan-Darshan Educational Channel (2000) (Vyas, et. al. 2002).

EduSat, a dedicated satellite for education and development was launched by ISRO in 2004. With the help of EDUSAT, television programmes can now be telecast in almost every Indian language and every primary school can be reached through this satellite to improve both quality and content of primary education.

### Using television in classroom

There is variety of educational programmes telecast on television ranging from monologue, dialogue, interview, demonstration lessons, panel discussions, quiz, drama, to simulated classrooms etc. You can use them in your classroom as per their utility in your subject. Box-2 presents highlights of a telecast on the topic 'Resources'.

#### Box 2: Highlights of a Telecast on the Topic 'Resources'

<b>Subject: Social Science</b>	<b>Topic: Resources</b>	<b>Class: VIII</b>
<b>Theme and major issues:</b>		
The telecast was based on the topic 'Resources'. This was a documentary based on resources. In the beginning, anchor introduced the concept of resources and told about types of resources with the help of some pictures. Later on, documentary presented short video clippings of natural resources like coal mines, oil wells, windmills, solar energy stations, etc.		
The documentary focused on various natural resources, their distribution, occurrence, uses and impact on human life. Documentary ended with a message on resource conservation.		
The anchor also explained about various activities to be performed in classroom related to the theme.		

While using television programmes in your classroom, you have to follow the following necessary steps.

#### A) Preparation for telecast

You have to plan for the use of television programme in your class.

- Collect the information in advance from telecasting agency i.e. Doordarshan or Gyandarshan (a television channel of IGNOU) or any other agency about the schedule of programmes as well as the topics;
- Make necessary arrangements for the telecast session in your classroom;
- Keep television at the right place, and make seating arrangement of students for proper visibility, ensure uninterrupted power supply and proper signal during the telecast;
- Brief students about the concept/topic of telecast well in advance;
- Prepare learning objectives, questions and arrange materials for demonstration (if required) during the telecast;
- If telecast is interactive in nature, arrange a telephone in the class for facilitating the students to ask the experts about their queries;

- If it is recorded telecast, instruct students to note down their queries and doubts in their notebooks during the telecast; and
- Ensure discipline and silence during the telecast.

### **B) During the Telecast:**

When the telecast starts, be vigilant in the class so that students remain attentive towards the telecast;

- Note down important points discussed by experts during the telecast;
- Note down those activities, which are demonstrated by experts, so that you can use them in your classroom teaching;
- Motivate students to learn more and more from the experts;
- If it is an interactive session, encourage your students to ask questions the experts using the telephone available in class;
- Clear your doubts by the experts during such sessions;
- Ask your students to note down places, dates and names of important persons cited during the presentation and
- Encourage students and keep them active during the telecast.

### **C) Follow-up**

Similar to radio broadcast, effectiveness of telecast sessions depends upon follow-up activities.

- Hold discussion on telecast topic, perform the activities suggested during the telecast, solve students' queries and clarify the doubts of students;
- Ask students questions to ensure the achievement of learning objectives;
- Apart from follow-up, evaluation of programme is also an important activities. The programme evaluation can be done by you as well as your students about the quality, relevance, ease of understanding and experts' attitude. This is helpful in improving the quality of the programme.

From your professional development point of view, these programmes are also very relevant. You can acquire updated knowledge, develop new skills and teaching strategies. Your interaction with experts helps you to clear your own doubts as well as facilitate you to sharpen your teaching skills.

### **Benefits of Television as an Educational Tool**

- Television has reach to masses so that it can spread the educational telecast to a large group in remote areas also.
- Educational telecast brings uniformity in the content and communication.
- The expert in telecast is regarded as master teacher.
- In practical subjects like science, costly and risky experiments can be demonstrated through telecast.
- Telecast is a time saving means of content dissemination.
- Telecast draw attention of learners to the relevant content as irrelevant contents are removed with the help of editing programme.

- Variety of activities like demonstrations, experiments, discussion, talk, lecture, etc. can be telecast so that monotony of classroom teaching could be broken.
- Teachers can use television as a medium in their classroom teaching, which helps them in reducing their load.
- Television helps teacher to learn new teaching strategies, methods and activities, which they can use in their classroom teaching.
- Students feel more motivated towards television programmes than classroom teaching.

**Check Your Progress 4**

**Notes:** a) Write your answers in the space given below

b) Compare your answers with those given at the end of the Unit.

6) How can television be helpful in qualitative improvement of elementary education?

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**12.5.3 Computer**

At present majority of devices are based on Digital Technology. One such device is Computer. The Computer is an electronic device that has the capacity to store, retrieve and process both qualitative and quantitative information fast and accurately. Computer Assisted Instruction (CAI) or Computer Assisted Learning (CAL), Computer Managed Instruction (CMI), Computer Based Instruction (CBI) are some educational applications. People started developing CAI for teaching different subjects at School as well as Higher Education levels. The CAIs were compared with the Lecture Method / Traditional Method and found that the developed CAIs were significantly superior to Lecture Method / Traditional Method in teaching different subjects.

Computers are often viewed as tools that can be used to achieve diverse learning objectives similar to the way that textbooks, laboratory experiments or other educational technologies are used to achieve.

**Using Computer in Education**

CAL implies that teaching learning activities are aided by some applications of the computer. The role of the computer can be as a teaching aid. It can be more student-centered. Barker (1988), as cited in Sen (2011), has suggested the following educational functions of computers:

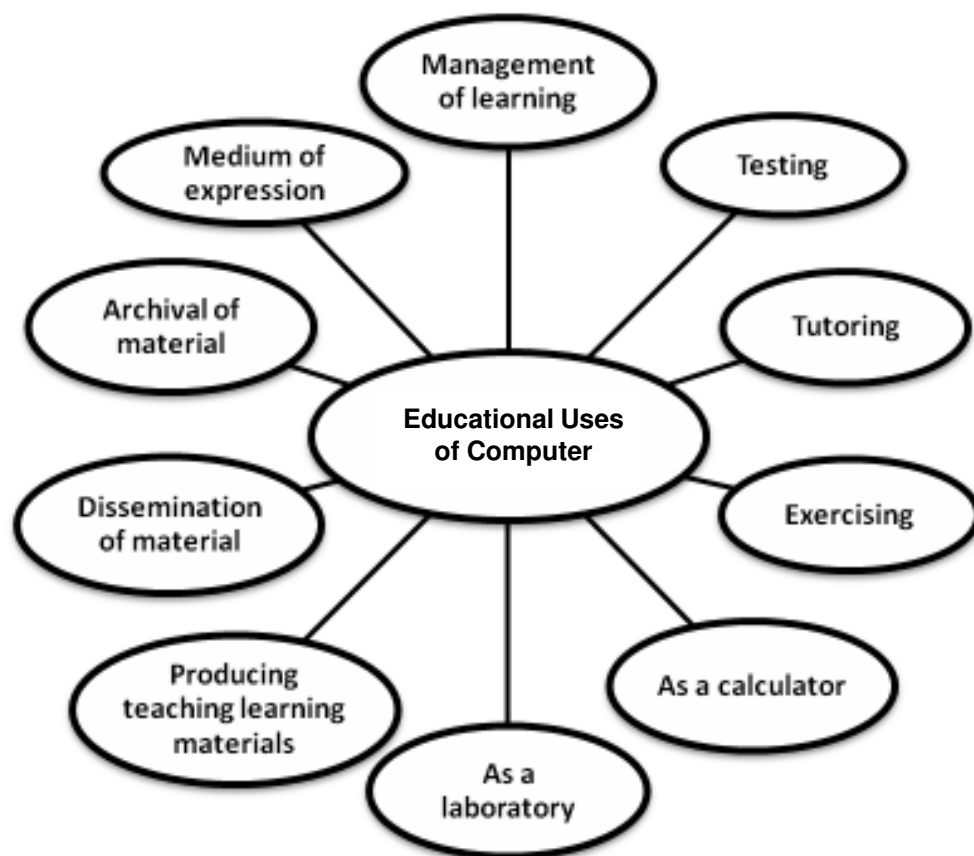


Fig. 12.3: Educational Uses of Computer

The scope of Computer Assisted Learning (CAL) includes a wide variety of functions. These functions are usually realized through different CAL modes. The major modes of CAL (Sen. 2011) can be noted as follows:

- i) Drill and Practice
- ii) Tutorial
- iii) Dialogue /Conversational
- iv) Games
- v) Simulation
- vi) Databases

**i) Drill and Practice**

Drill and Practice is the simplest form of CAL. A series of exercises is presented to a student by the computer. The student gives a response. The response is processed by the computer and accordingly new activity is designed. Exercises can be created by the computer by avoiding repetition. The items can be selected randomly from the list and presented. Sometimes the series is presented as it is. Also endless exercises can be provided. As a response to the exercise, the programme either asks the student to try again till it is right or provides a chance or just states the right answer. The responses are also analyzed to mark the success or to assert the need of more study. The questions in the drill and practice are of these types: fill in the blanks, odd man out, correct or wrong, answer in a word/ sentence, multiple choices. Activities like drawing, measuring and arranging objects are also possible on computer. Generally, writing long answers is avoided in CAL.

**ii) Tutorial**

In tutorial the topic to be studied is divided into a sequence of short sections called frames. It bears a close resemblance to the programmed learning sequences found in print and in teaching machines during 1960's. The programmed text presents a number of problems, particularly in determining whether the student has really mastered the current step and in deciding how to branch to the next step. The computer can be used to determine students' needs and preferences and to decide how to branch through material.

The material can be more complex without adding to students' burden. The computer opens up a range of possible branching, which would have been difficult to arrange in the scrambled text or primitive teaching machine. The computer can be programmed to branch any number of alternative pages in text where there are many different routes. In tutorial, each learner is diagnosed at every small stage and led to a new path according to his/her need.

**iii) Conversation or Dialogue**

Dialogue is based on the teaching-learning method used by Socrates. Both teacher and learner take an initiative to start the teaching-learning process. They can ask each other questions and answer them. These types of tutorials require very complicated and time-consuming programming. Also these are not cost-effective instructional systems. In dialogue the computer is engaged in learning about the learner. Thus they try to improve and further individualize the instructional strategy being used. Deep questioning techniques and multifaceted analyses of the responses given by the student can help in building complex interactive dialogues.

**iv) Games**

The modes discussed earlier provide information in a structured way, according to rules specified by the author. Gaming involved with an objective of competition motivates learners to approach the given situation with enthusiasm. If concepts are taught or given for practice through games, learners generally learn them with enthusiasm regardless of the time they consume. Video games as well as computer games, without any educational input, are very popular with children who have access to a computer. If they are provided with instructional games, they will certainly acquire new concepts and skills.

**v) Simulation**

A few real life experiences or phenomena can not be learnt directly. The experiments may be time-consuming, expensive, difficult or sometimes dangerous too (e.g. fission of atom). Computer can be used to simulate a real life system by following a set of rules, which approximate the behaviour of the real system. The rules specified for simulation may be simple or complex and quality of approximation can be governed. Various levels of approximation can be provided in the same simulation courseware. It allows effects of increasing experimental error or to give a feeling for the accuracy of the simulation. Simulation offers flexibility and control. In simulation, the particular feature of the computer as an ultra rapid calculating and data processing machine is used to its best advantage.

Simulation can provide the following advantages:

- 1) It overcomes the difficulties and complexities of real phenomenon by using idealized conditions. For example, increase or decrease in demands and supplies of commodities to see their effects on the market economy.
- 2) It overcomes the prohibitive costs of laboratory or field-work based experiments. For example, providing variety of acids with different densities in a laboratory for one single experiment.
- 3) The time normally required for an experiment can be foreshortened.
- 4) Dangerous experiment can be experienced in safe environment. For example, increasing proportion of pollutants in the environment to see their consequences.
- 5) Experiment, which would normally be impractical, can be attempted. For example, creation of civilization on a different planet.
- 6) The level of complexity can be increased slowly. Variables can be added at every stage.

#### vi) Databases

One of the modes of learning is learning through exploration of resource material and library utilization. The power of a computer to store, retrieve and process information is used to help the student as s/he browses through the material. One can respond to the questions about the related information and retrieve from the data base an item which one needs, summarize statistical data, suggest possible times of investigation.

As in the library a book or a resource material can be found using subject code, author index or title index, one can provide such key words to the computer to find resource material. Unlike books, material stored in a main-frame computer can be made available at all the terminals at a time.

#### 7) Narrative/Presentational

In this mode computer screen is used to present material to student in a form sometimes referred to as an electronic blackboard. Along with normal verbal approach, movement and animation can be used with colors and music. Simple presentations can easily be developed by teachers to introduce learners to new information. For example, a teacher can develop slide shows using MS-Power Point or even develop web-pages using Front-Page.

#### Advantages of Cal

The learning process could be strengthened in many ways through these modes. Advantages of the CAL approach are mentioned below:

- 1) CAL is individualized, that is each student is free to work at his/her own pace, totally unaffected by the performance of any other students. Since it can provide a method of instruction designed for self-directive study, it helps in improving skills or achieving objectives at different difficulty levels.
- 2) Information is presented in a structured form. It proves useful in the study of a subject in which there is hierarchy of facts and rules.

- 3) CAL forces active participation on the part of student, which contrasts with the more passive role in reading a book or attending to a lecture.
- 4) It provides student immediate feedback due to active student participation. Feedback may be remedial in nature, or it may direct student to a certain path depending on its response.
- 5) CAL utilizes a reporting system that provides student with a clear picture of his/her progress. Thus students can identify the subject areas in which they have improved and in which they need improvement.
- 6) By enabling students to manipulate concepts directly, and explore the results of such manipulation, it reduces the time taken to comprehend difficult concepts.
- 7) CAL also saves time and effort of teachers as well as students. Teachers need not waste their time and effort in arranging the same instructional experiences, forming questions for every student, evaluating them at every learning stage, as all these are carried out by the computer programme.
- 8) CAL offers students a wide range of experiences that are otherwise not available. It works as a multimedia providing audio as well as visual inputs. It enables student to understand concepts clearly with the use of stimulating techniques such as animation, blinking, graphical displays, etc.
- 9) Simulation has great significance in situations, where a conventional practical demonstration is extremely difficult, impossible or dangerous, where the apparatus is not readily available, when a real situation would take long time to investigate or where manipulation of different variables may prove useful.
- 10) Learners can be provided with multiple-choice questions having any number of options. Also a series of responses may be provided with each response providing feedback on each of the options.
- 11) CAL can enhance reasoning and decision-making abilities.
- 12) Students who use CAL become increasingly self-directed in their learning styles. They become more responsible for learning and less dependent on teachers.

**Note: We acknowledge that the section on Computer and Computer Assisted Learning (CAL) has been adapted from IGNOU(2000).**

**Check Your Progress 5**

**Notes:** a) Write your answers in the space given below

b) Compare your answers with those given at the end of the Unit.

7) Explain the concept of computer assisted learning (CAL)? How is it beneficial in elementary education?

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## 12.5.4 Internet

The most popular computer application in education these days is 'Internet'. The Internet can be defined as the wired or wireless mode of communication through which one can receive, transmit information that can be used for single or multiple operations.

For efficient worldwide communication, high speed information highways are being set up by various governments and private information technology firms. Through video chats and conferences, the need to travel has reduced quite a lot and people from the world of their lives are reaping the best of the internet services.

### How does Internet work?

While the working of internet appears to be complex, its use in day to day activities is found to be very simple. Let us suppose that every house in our locality is equivalent to a device that uses internet, such as a smart phone or a tablet computer. The addresses that the houses have are just similar to the IP address, which is unique and unavailable for any other device all around the world. The posts and phone calls that arrive in the house are sources through which the world connects to the house and through the same medium the people in the houses communicate with the outside world. Writing down the mails or picking the phone instrument to make is quite similar to connecting to the internet or rather opening a web browser.



There are exchange offices and post offices to send and receive the posts or phone calls. Similarly, there are servers that store all the data and make it dynamically available on the internet. The calls we make are first directed to the telephone exchange office that checks whether the number we have dialed is valid or not. Similarly, the protocols are applied when user requests for data exchange. Just as the number of houses decides a place to be called as village, town, city or state; similarly, number of internet connected devices defines an area to be categorized into local area network (LAN), wide area network (WAN), etc.

### Educational Applications of Internet:

The Figure 12.4 provides different educational applications of Internet.

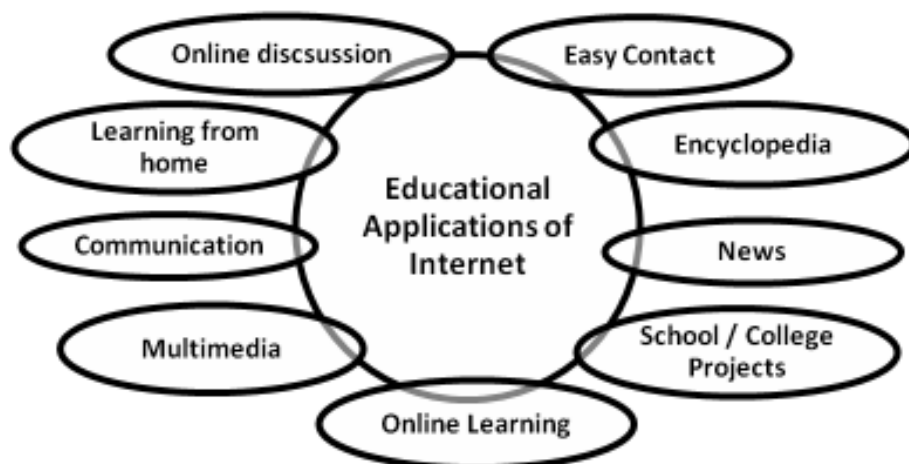


Fig. 12. 4: Educational Applications of Internet

- i) **Easy contact:** As mentioned earlier, communication is one of the biggest advantages of the Internet in education. You can contact your students as well as students can contact other students via the E-mail, and social networking sites. Sharing of information, discussion on a particular subject, etc. can be easily carried out using the Internet. At the same time, you can also contact parents and guardians of children easily using Internet.
- ii) **School/College projects:** The Internet can be most useful for completing projects in elementary schools. As the Internet is full of information pertaining to different subjects, one can easily find information, research work, etc. required for one's projects. Going through the information on the Internet is definitely faster than reading an entire book on the subject. Homework is also made easier with the help of the Internet.
- iii) **Encyclopedia:** Sometimes, encyclopedia may not always be available or accessible to students. In that case, encyclopedias of different subjects available on the Internet can be helpful to students. Wikipedia is one of the most used online encyclopedias.
- iv) **News:** News is constantly updated on different news sites. Students can have an access to all the current affairs on the Internet in the school campus, at home, or at any other place. Online e-newspapers are now available on the Internet in almost all the languages. Students can collect updated information from these e-newspapers very easily.
- v) **Online Learning:** Internet is used extensively in distance education or online learning. One of the benefits of online learning is that students from any part of the world can gain knowledge on different subjects, complete courses, etc. with the help of online learning.
- vi) **Multimedia:** The Internet allows students and teachers to access multimedia content, which is not possible to access through other media. Students can learn about their subjects by watching video, pictures and listening to audio contents. We discuss in details multimedia in next section.
- vii) **Communication:** The Internet also allows students to communicate with each other more easily. Students are able to share information via email, instant message and file transfers. This aids them in group project work. Students located in remote places can organize conference among themselves, work together on the project as if they are in the same room. This increases efficiency in the students' work and allows them to learn communication skills, needed for in the workplace.
- vii) **Learning from home:** Some elementary schools broadcast their lectures on the Internet so that students who do not attend the lessons can at least watch them at home. Students can access these saved lectures later on. This helps them in preparing for examinations.

In the above section, we have discussed various applications of Internet in education. Other applications of Internet in education are using it for admission process, academic evaluation, academic administrations, as a source of information, communication tool etc.

**Check Your Progress 6**

**Notes:** a) Write your answers in the space given below

b) Compare your answers with those given at the end of the Unit.

8) How can Internet help teachers to improve their teaching and learning?

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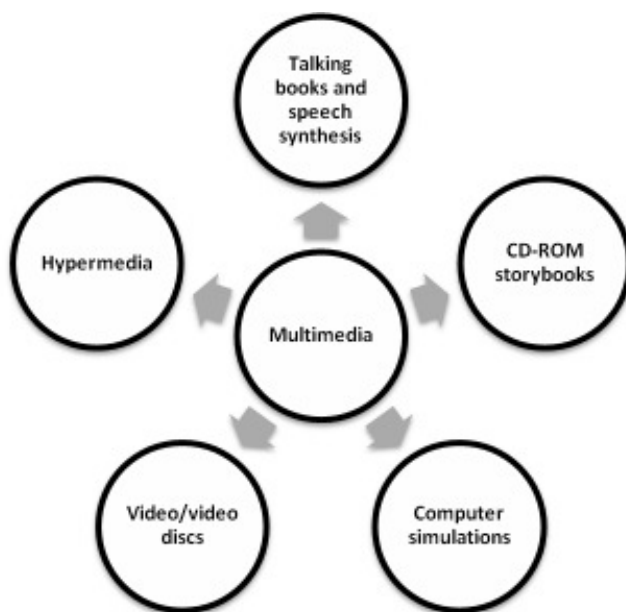
**12.5.5 Multimedia**

The use of multimedia in education has recently become more common. Multimedia is the combination of various elements like text, color, graphics, animation, audio, and video. The use of multimedia facilitates both teachers and students to effectively transact learning experiences. Multimedia is in essence “a presentation of information that incorporates multiple media such as text, audio, graphics, and animation.”

Teachers have been using multimedia as a teaching-learning tool for years; this is because multimedia offers the experiences of listening, watching and working in a computer-mediated setting. It can be exciting, interesting, motivating, and help students achieve learning objectives in new ways. The use of sound, photographs and video enables the user to experience the real world situations which may not be possible with the more conventional methods of instruction (Oliver, 2000).

**Types of multimedia and their classroom applications:**

There are numerous types of multimedia. Let us discuss different forms of multimedia suggested by Center for Implementing Technology in Education-CITE (2006) and their potentials for supporting diverse learners.



**Fig.12.5: Types of Multimedia Applications in Education**

- i) **Talking books and speech synthesis:** Digital texts can be read aloud using recorded human voice or synthetic text-to-speech programs. Read-aloud is an intrinsic feature of so-called talking books, but with text-to-speech software, virtually any digital content including web-based texts can be read aloud, with or without synchronous highlighting of the printed text. Read-aloud can support the development of key literacy skills such as fluency and reading comprehension, and increase engagement and motivation.

Text-to-speech is also a beneficial writing tool. It may be easier for students to recognize errors when listening and reading a composition. By using text-to-speech to read back the text they have written, students may be able to revise more successfully.

- ii) **CD-ROM storybooks:** CD-ROM storybooks offer digital text in combination with features such as animations, illustrations, speech, and sound. For example, a CD-ROM storybook might offer the story text together with animations, vocabulary definitions, and sound effects. Some storybooks incorporate an audio version of the text. CD-ROM storybooks offer great potential for engaging students, and some incorporate valuable literacy skills. Thus, they can benefit students with deficits in basic literacy skills.

- iii) **Video/videodiscs:** Video/videodiscs offer a means to contextualize curriculum content and instruction across the curriculum. For example, video can be used to anchor mathematics instruction to an authentic context. That is, video can be used to present to students a real-world context within which mathematical problem-solving can be situated.

- iv) **Hypermedia:** Hypermedia refers to hyperlinked multimedia—the linkage of text, audio, graphics, animation, and/or video through hyperlinks. For example, a hypermedia study guide might offer illustrated textbook content hyperlinked to web-based video and other content, glossary entries, and comprehension questions.

Digital texts can be enriched with a range of instructional supports. For example, vocabulary definitions might be presented as text, pictures, and/or animated graphics. Background information might be presented as a map, video, annotated bibliography with text and audio or illustrated timeline.

Using hypermedia, teachers can help a variety of learners, including English language learners, second language learners, and students with comprehension problems, to overcome important barriers posed by printed texts.

- v) **Computer simulations:** Computer simulations are computer-generated versions of real-world objects (for example, a brain) or processes (for example, an election). Computer simulations are a means to “open up the walls of the classroom,” providing students with an opportunity to observe, manipulate, and investigate phenomena that are normally inaccessible by using tools and materials not available in the classroom.

Computer simulations can be used to increase content knowledge. Simulations are particularly well suited to confronting students with their misconceptions about essential learning concepts and helping them to develop more accurate

conceptual models. Simulations can also be used to develop skills. For example, simulated science experiments can be used to facilitate mastery of science process skills.

**Benefits of using multimedia applications in classroom:**

- You can engage and motivate students to participate in classroom activities as the use of multimedia in teaching-learning makes it more interesting and interactive.
- It provides students with an opportunity to feel a different classroom environment.
- You can use audio-video multimedia applications/CDs in absence of computer/internet facility so that students can get benefitted.
- Multimedia applications are of great use with those students, who have some learning difficulty or disability.
- Multimedia turn the classroom environment from teacher centered to student centered.

**Check Your Progress 6**

**Notes:** a) Write your answers in the space given below  
 b) Compare your answers with those given at the end of the Unit.

9) Write down some multimedia applications at elementary level in which computers are not required.

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**12.5.6 Mobile Learning**

Mobile phones first arrived in India in 1995, and since then their application has grown exponentially. Education through mobile is often referred as *mLearning*.

*mLearning* makes education more accessible as it enables learners to pursue their studies according to their own schedule. The portability of mobile technology enables students to learn at all times and at all places. For those in rural or remote areas where environmental and infrastructure challenges hinder other learning modalities, particularly *eLearning*, *mLearning* presents great opportunities. *mLearning* provides a potential way forward for the expansion of education programs to larger segments of the population. *mLearning* allows a method of educational delivery that could be more cost-effective than other methods.



For those in rural or remote areas where environmental and infrastructure challenges hinder other learning modalities, particularly *eLearning*, *mLearning* presents great opportunities. *mLearning* provides a potential way forward for the expansion of education programs to larger segments of the population. *mLearning* allows a method of educational delivery that could be more cost-effective than other methods.

The technological capacities of mobile phones allow communication by voice and text and capture still and moving images. Recent ‘smart phones’ allow users

to view PDFs, spreadsheets and word-processed files, and possess additional features such as a stopwatch and a GPS (Global Positioning System).

If mobile phones are to be used in schools, school authorities need to address certain issues. These are leadership and school culture; attitudes of teachers and students; appropriate curriculum activities; professional development of teachers; technical integration and support; and policies pertaining to the use of mobile phone.

**Mobile Phones in Education can be used in the following ways:**

- 1) Use SMS to send definitions, small formula, math equations, difficult words, etc.
- 2) Use as an internet browser to access endless information
- 3) Read news articles and current events and books
- 4) Download and use education programs such as Google Maps, Google books and use as GPS
- 5) Use of digital or video camera of mobile for taking pictures during visit, exhibition or excursion for school projects, etc.

<p><b>Check Your Progress 7</b></p> <p><b>Notes:</b> a) Write your answers in the space given below  b) Compare your answers with those given at the end of the Unit.</p> <p>10) In what ways, mobile can be used as a helping tool in elementary education?</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p>
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## 12.6 LET US SUM UP

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As ICTs have transformed the whole educational scenario, elementary education is not an exception. These technologies play an effective support role to achieve our goal of qualitative elementary education for all. In this unit, we have discussed the concept of ICTs and their applications in education. Motive behind giving you idea about various applications of ICTs was to sensitize you about these technologies. You can find out many more applications as these are changing at a fast pace. Radio broadcasting and telecast are of great use for students and teachers. These can be used with other media for better interaction and support for the learners as well as for teachers. Computer is being used in teaching-learning process frequently now-a-days. We have new tablets like Akash launched by Ministry of Human Resource Development (MHRD), Govt. of India.. You must be equipped with skills to use these new technologies as students are becoming familiar with them. Use of interactive white boards, digital projectors is very effective ICT application in education. Teachers and students enjoy them. Mobile is also very effective tool. Your responsibilities are not only to understand these technologies but also to use them as a helping tool in the teaching learning process.

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## 12.7 UNIT END ACTIVITIES

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- 1) Collect some information on the usage of modern form of computers in education and highlight their advantages.
- 2) What are the advantages and disadvantages of using ICTs in elementary education?
- 3) In Indian scenario, what kind of difficulties you will face, if you want to use ICTs in your classrooms?

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## 12.9 ANSWERS TO CHECK YOUR PROGRESS

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- 1) Information and communication technology consists of three specific terms, **information**, **communication** and **technology**. Communicating information effectively by making use of appropriate technology is called information and communication technology (ICT).
- 2) Radio, television, video, DVD, telephone (both fixed line and mobile phones), satellite systems, computer and network hardware and software etc. are included under ICT.
- 3) ICTs can be used in many areas of classroom teaching such as diagnostic testing, remedial teaching, evaluation activities, psychological analysis of learners, development of reasoning and thinking among students and instructional material development.
- 4) Write on the basis of your own observations.
- 5) Radio broadcast programs invoke teacher as well as student participation and action in every step of the learning process.

Students are commended for their correct answers, and hard work, and the in-class teacher is instructed to praise students for their effort. In addition to respect, good manners, and equitable interaction, the program makes learning fun for both teachers and students. It also improves teachers' content knowledge, students' attendance in classroom, language and communication abilities, etc.



- 6) Television broadcasting brings many qualitative improvements in teaching learning. It removes the pedagogical difficulties in the teaching of various subjects. Direct observation of many processes, experiments, etc. are possible. It provides an opportunity to interact with other teachers, who are experts in their field.
- 7) Computer assisted learning (CAL) is used to teach students by providing programmed instructions and information. Students learn as per their learning speed and solve problems associated with it.
- 8) Internet can help teachers in developing projects, taking information from various resources, online tutoring, taking help from computer based multimedia applications, self-paced learning etc.
- 9) There are many multimedia applications like radio, television, audio/video CD/DVDs, interactive counseling, mobile phones, filmstrips, slides etc in which computers are not required.
- 10) Mobiles can be used in many ways in education:
  - Use SMS to send definitions, small formula, math equations, difficult words, etc.
  - Use as an internet browser to access endless information
  - Read news articles and current events and books
  - Download and use education programs such as Google Maps, Google books and use as GPS
  - Use of digital or video camera of mobile for taking pictures during visit, exhibition or excursion for school projects, etc.