BHARATHIDASAN UNIVERSITY

TIRUCHIRAPPALLI – 620 024

CENTRE FOR DISTANCE EDUCATION

TEACHING OF COMPUTER SCIENCE

B.Ed. I YEAR

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The Syllabus adopted from 2015-16 onwards

INDEX

SYLLABUS

TEACHING OF COMPUTER SCIENCE

Total Marks: 100 **Duration of Examination: 3 Hrs**

Internal Assessment: 25

External Assessment: 75

OBJECTIVES

After the completion of this course the student teacher will be able

1. Acquaint with the aims and objectives of teaching computer science.
2. Acquire knowledge of computer and its hardware, software components.
3. Acquire skills of micro-teaching.
4. Familiarize with the various methods that can be employed for the teaching of computer science.
5. Acquaint in preparation of instructional materials.
6. Acquire knowledge of latest trends in Information Technology and assessment techniques.
7. Acquire knowledge of evaluation in computer science.

COURSE CONTENT

Unit I: Aims and objectives of teaching computer Science

Aims and objectives of teaching Computer Science-Blooms taxonomy of Educational objectives-computer science teaching at different levels: primary, secondary and higher secondary levels-Attainment of the objectives of computer science teaching.

Unit II: Hardware and Software of Computers

Hardware components of computer-Input and Output devices-types of computers - History of Computers-Network Communication-Computer viruses-Protective measures. Software: definition-system software-Application software-High level and Programming languages-use of computers in schools.

Unit III: Micro Teaching

Micro Teaching-meaning, definition-Characteristics of micro teaching-features of Indian model of micro teaching-Micro teaching cycle-Steps in micro teaching cycle-Practice of relevant skills-Reinforcement-Stimulus Variation-Explaining-Probing Questions-Demonstration-Skill of Using Black Board-need for link lesson in micro teaching.

Unit IV: Instructional Methods

Year Plan, Unit plan: Preparation and use of unit plan, Lesson Plan: Importance of lesson plan, writing instructional objectives and planning for specific behavioural changes. Lecture-demonstration-Problem Solving-Project method-Scientific method-analytic and synthetic methods. Inductive-deductive approaches of teaching computer science. Individualized instruction-programmed instruction-Computer Assisted Instruction (CAI), Steps for developing CAI, modes of CAI, benefits of CAI, limitations of CAI, role of teacher in CAI-Computer Managed Instruction.

Unit V: Instructional Aids

Instructional material or teaching aids: Black board-Charts-Maps-Graphs-Diagrams-Visual Media-Interactive White Board-Power Point Presentation (Multimedia presentation-Preparation and use of the instructional media).

Unit VI: Latest Trends in Information Technology

Multi media-desk top Publishing-Internet and its uses-E-learning: definition, meaning, Modes of e-learning, characteristics of e-learning, e-learning tools, benefits of e-learning-Virtual Learning-Web enabled/based learning-Tele conferencing-Video conferencing.

Unit VII: Evaluation in Computer Science

The concept of evaluation-objectives based evaluation-tools and techniques in evaluation. Evaluation for achievement, diagnosis and prediction-Formative and summative assessment-Grading pattern-Computer Aided Evaluation-On line examination. E-assessment: definition, types of e-assessment-risk involved in using e-assessment-limitations of e-assessment.

PRACTICUM

- Practice of a minimum of five skills on Micro teaching.
- Preparation of Unit plan
- Preparation of Lesson plan
- Linear Programming (Minimum of 20 frames)
- Multimedia Presentation (Minimum of 20 slides)
- Identification and cataloguing of three websites relating to the prescribed school curriculum

Comparative evaluation of any two web pages bearing on the same unit in the school curriculum

UNIT I AIMS AND OBJECTIVES OF TEACHING COMPUTER SCIENCE

Structure

1.1 INTRODUCTION

Computer science is an integral part of our lives, shaping virtually everything from the objects around us to the ways in which we communicate, travel, work, and play. And the computer revolution has just begun – **Computer science** is now a key enabler for discovery and innovation in most other fields of endeavor, making it an incredibly relevant course of study. **Computer scientists invent the future** by developing architectures and techniques for more advanced computing, and by developing the applications that operate within those frameworks. Its fields can be divided into a variety of theoretical and practical disciplines. Some fields, such as computational complexity theory (which explores the fundamental properties of computational and intractable problems), are highly abstract, while fields such as computer graphics emphasize real-world visual applications. Still other fields focus on challenges in implementing computation. For example, programming language theory considers various approaches to the description of computation, while the study of computer programming itself investigates various aspects of the use of programming language and complex systems. Human–computer interaction considers the challenges in making computers and computations useful, usable, and universally accessible to human beings. In this unit an elaborate study is provided on the aims, needs , importance and objectives of teaching computer science, Bloom's taxonomy. Further, it deals with Computer Science teaching at different levels, Place of computer Science in the School Curriculum and Teaching of Computer Science in relation other School subjects.

1.2 OBJECTIVES

After studying this unit, you will be able to:

- Understand the aims and objectives of teaching computer science
- Describe the need of teaching computer science in schools
- Understand the Bloom's taxonomy of Educational Objectives
- synthesis the Computer Science teaching at Different Levels: Primary, Secondary and Higher Secondary levels
- Understand the place of Computer Science in the Higher Secondary Curriculum
- Analyses the Importance of Computer Science in the Higher Secondary level

- Understand the procedure of Computer Science Teaching in relation to other School Subjects.

1.3 AIMS AND OBJECTIVES OF TEACHING COMPUTER SCIENCE

The purpose of computer science teaching in school is to enable student to grasp the basic knowledge needed from further study of computer science and the related technology and to understand its application. Also it should help the learners acquire the skill of practical utility, develop the capacity to think further and apply those skills is the real life situations. As the technology makes the world shrunk day by day, it is essential that the students are made to be aware of the modernization, along social lives, of industry, agriculture, national defence, national and international affairs. No field in the world at present can claim to be free of technological touch; and with technology, can achieve to any height.

Computer science in school subjects should be considered as

1. A body of knowledge
2. An attitude towards life, thinking and growing
3. A tool for the work man

To help the students attain the above qualities, the quantity of the content, the course subject matter must have certain qualities.

Thurber and Collette have proposed the following criteria for selection of aims.

1. **Usefulness** : The knowledge gained should be useful to the pupils in their lives.
2. **Timeliness** : The knowledge given should be concerned with material objects with which students are familiar.
3. **Fitness** : The knowledge must fit into a sequence that leads the students to broad objectives.
4. **Appropriateness** : The learning should be appropriate to maturity and background of the students.
5. **Practicability** : It means that experiences required for the development of Aims and Objectives learning should be possible.

The teaching learning activities provided along these lines enable the students to acquire the right knowledge and practice it. Acquisition of knowledge and application of skills make one to be an able person.

Knowledge + Skills (appropriate) = Ability

Here knowledge also involves more complex process of relating and judging and skills refer to the operational techniques for dealing with problems.

1.3.1 AIMS OF TEACHING COMPUTER SCIENCE

The teaching of computer science should aim to

- Provide the fundamental knowledge to the students.
- Make the students understand the relevant knowledge and skills in computer science.
- Develop in them the skill of thinking and analyzing
- Inculcate proficiency in reasoning and synthesizing
- Create interest and scientific attitudes.
- Induce in them the thirst for acquiring knowledge.
- Develop communicative skills and soft skills.
- Identify their emotional intelligence
- Equip them with the skill of using computers.
- Help the students apply the knowledge in learning activities.
- Help the students attain thinking process.
- Make the students associate the knowledge in real time application.
- Imbibe in the students the skill of acquiring knowledge, create knowledge and share their expertise.
- Dig out the latent talents in the students.
- Make the student attain the skills of initiatives.
- Develop in the students be collaborative, inquiry and coordination capabilities.
- Build team spirit
- Train the students understand and identify the problems and issues direct or indirect and analyze them, code and decode for the computer processing.
- Help the students attain the skill of problem solving.
- Help them posses the ability for local and global accessing of information.
- Provide them vocational skills
- Provide self concept, sense of acceptance and sharing qualities

- Inculcate citizenship and love for the society and Nation
- Promote local and global understanding.

1.3.2 NEED FOR TEACHING COMPUTER SCIENCE

"Education is essential for both employment and entrepreneurship" says Dr. Kalam to a school student's question. – (Readers Digest, November, 2004)

In the global automotive Industry almost all major systems like engines transmission, power trains, breaking systems are controlled through computers – (Data Quest, March 2005)

Indian biotech firms should look at UK as business destination – (The Hindu, April 23, 5005)

Based on the above few of the millions of statements, the Classroom Instruction in Schools should be given serious attention for its worthiness and provide the futuristic, technology oriented education. The technological advancement and the Industrial competitions year every one to be active on the wheels of revolutions. As a result, according to the theory of "the survival of the fittest", the fittest person who is accommodative and adaptive in nature merges as a successful person in the midst of accelerating changes, rapidly advancing technology and sudden thrust to a global scene. The global changes have its own effect on the Educational Institutions at a great extent. The challenges faced by the education industry in the knowledge era primarily revolve around

- providing wider accessibility
- ensuring continuing relevance of course and
- quality assurance

The above challenges are met with confidence only by the use of computers. The use of computers is inevitable and it has become a necessary electronic gadget in every individual's life. At the same time its progress is in geometric proportion. Hence it is essential for the school children to learn about the nature, scope, and use of computers in the school itself. "The approach in the Natural curriculum Framework developed by NCERT in 2005 emphasises that children should be helped to construct their knowledge, with the teacher only being a facilitator, there is a need to develop a number of exhibits with the help of which, the teacher could promote the spirit of exploration, investigation, and enquiry…" said Mrs. Pratibha Patil, president of India.

Undoubtedly, these qualities can be achieved within the children through computer literacy in this electronic era.

Shashi Tharnoor, a former UN diplomat with a keen insight informs "India is entering the global employment market place with a self imposed handicapped of which we are first beginning to become conscious-an acute shortage of quality institutions of higher education. For far too long, we have been co-placement about the fact that we have produced, since the 1960s, the world's second largest pool of trained scientist and engineers".

By introducing computer science is the school curriculum, which is also a foundation for higher education, we can confidently challenge that the educational industries be fixed on to the global standards.

"Nanotechnology is knocking at our doors. We should be aware of the trends of technology and nurture our young minds : said Dr. A. P. J. Abdul Kalam.

1.3.3 OBJECTIVES OF TEACHING COMPUTER SCIENCE

The objectives of teaching computers are basically of two folds. Those students who terminate their studies with schools need to be equipped with vocational skills in order to help them get a job is one factor. The other factor is, the learning community which goes for higher education should be provided with good and strong foundation of computer science in the school itself. Any amount of computer science courses without the foresight of the future will be of no use. Hence the aims of teaching computer science in schools should have those learning activities which the society immediately needs and also the knowledge that would be needed for the future development need to be imparted to learners. The teacher being a facilitator need to inculcate is the learning society, the scientific temper that which equip them to meet the challenges in their future.

1.3.4 CHECK YOUR PROGRESS

Note: a) Write your answers in the space given below

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

1.The Approach In The Natural Curriculum Framework Developed By NCERT In 2005 Emphasises that children should be helped to ---------- their Knowledge.

1.4 BLOOM'S TAXONOMY OF EDUCATIONAL OBJECTIVES

The objectives of teaching computer science in schools are as follows:

Objectives are the specific and precise behavioral outcome of teaching a topic. The main objectives of teaching computer science must ensure better match between the industry's requirement and outputs of the education sector emphasizing the quality needs. The teaching of computers should make phenomenal effects on the learners. It is complex in nature. Hence teacher, the facilitator must imbibe in the students the initiatives, inquiry, analytic and comprehensive abilities.

Knowledge acquisition, adaptation, and utility are the prime slogans of the present learning society. Hence learning computers from the school is the need of the hour.

Whole human processes can be divided in three levels as follows:

Activities related to head – Cognitive Domain

Activities related to heart – Affective Domain

Activities related to hand – Psycho-Motor Domain

On the basis of these three Domains, B.S. Bloom and his associates divided educational objectives and there were six objectives for each domain.

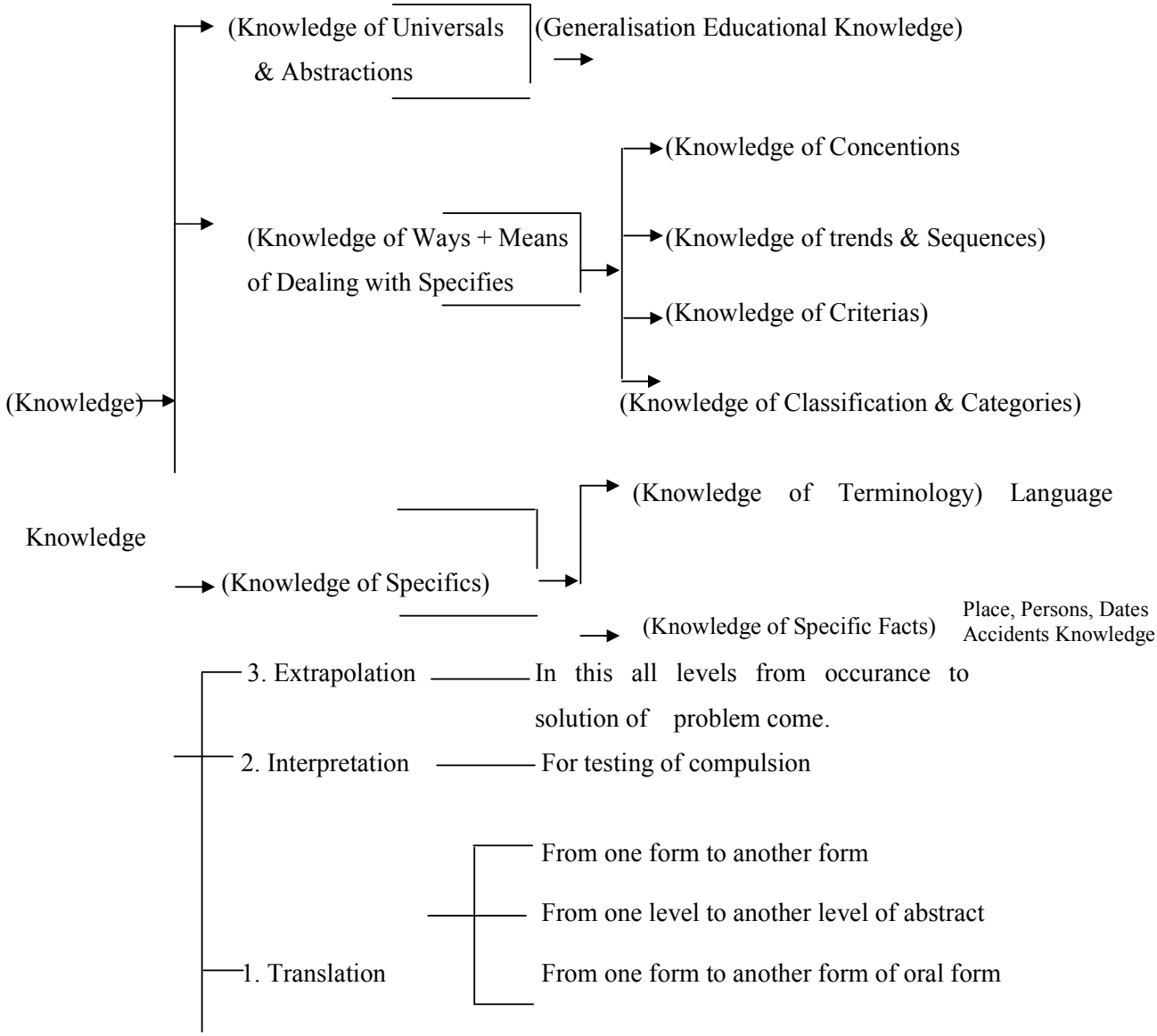
Cognitive Domain	Affective Domain	Psycho-motor Domain
1. Knowledge	1. Receiving	1. Impulsion
2. Understanding	2. Responding	2. Manipulation
3. Application	3. Valuing	3. Control
4. Analysis	4. Conceptualization	4. Co-ordination
5. Synthesis	5. Organisation	5. Naturalisation
6. Evaluation	6. Characterisation	6. Habit Formation

1.4.1 OBJECTIVES OF COGNITIVE DOMAIN

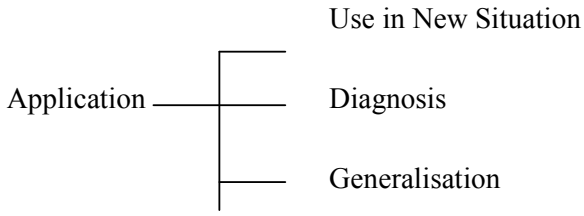
1. Knowledge : Really knowledge works on memory level teaching. It is related with pre learned of thing. In this recognition of broad area pre-learned subject from any to fact to whole theory comes. In recognition there are two mental processes occur.

In this way in this objective students gather knowledge about facts, principles, relationship, ideas, processes, axioms, postulates, definitions, hypothesis and historical order of subject-matter.

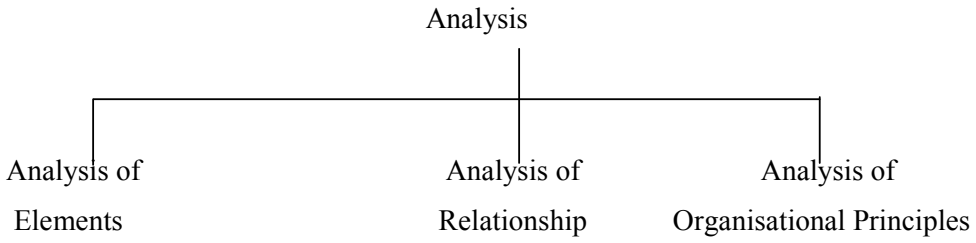
2. Comprehension: The capacity of understanding is called comprehension. In this, acceptation of any communication accurately, changing it to another form and recollection without centralization comes. It can be cleared by divided it in following three states.



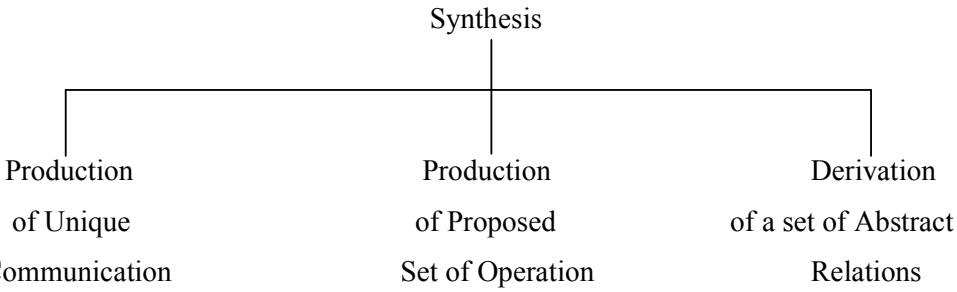
3. Application: This objective is gained after achieving knowledge and comprehensive objective. The development of capacity of using their knowledge in new circumstances of life comes in this objective. It can also be learned by dividing, it in following three levels.



4. Analysis: This objective can be exactly achieved after above three objectives. In this whole contents are divided in internal parts and components and a relationship is established between them. It can also be cleared by dividing it, in following three levels.



5. Synthesis: It indicates to the capacity of accumulation of different facts and of recollect them in a new form. In this production of peerless co-ordination also comes. It can also be cleared by dividing it, in following three levels.



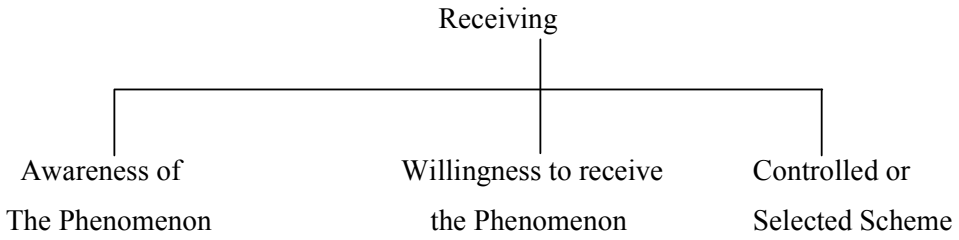
6. Evaluation: In this decision on acceptance and usefulness of any thing, event, facts etc., are taken by use critics view. In this any standard is used to evaluate accuracy, effect and feasibleness of anything. This decision can be qualitative or quantitative.

1.4.2 OBJECTIVES OF AN AFFECTIVE DOMAIN

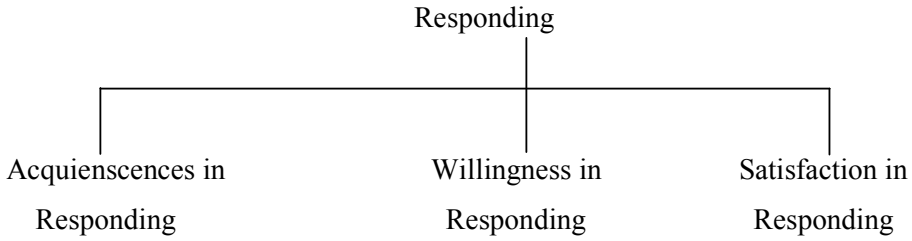
In 1964, Bloom, Crethwall and Masiha did much hard work for categorization of objectives in this favour. For this they used the concept of Internalisation as base.

In this objective of interest, inclination, values and co-ordination development comes.

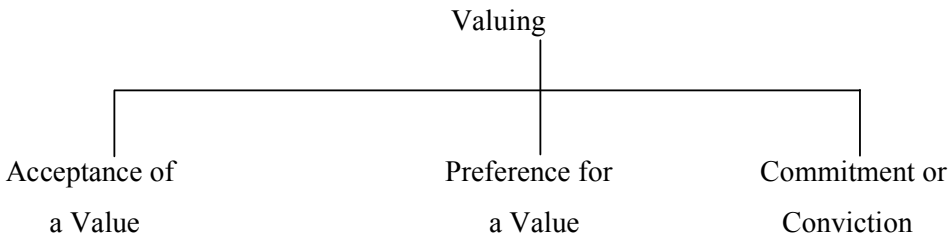
1. Receiving: Sensitiveness for desire or stimulus to accept any thing is receiving. Its three level are



2. Responding: active reaction for stimulus is responding. It is much like as 'Interest' its three levels are



3. Valuing: The behaviour of child, by which he represents his feelings about superiority, value and characteristics of any thing, fact, event and behaviour. Since it is related to faith for values, therefore, for specific value acceptance, priority and conviction adds three levels .They are



4. Conceptualsation: The base of construction of thinking or concepts is similarity and dissimilarity. Even whenever student builds concepts by establishing similarity, difference and relationship in existing values, then their behaviour comes in this objective. As result of variation of values, concept making for solving problems comes in this.

5. Organisation: Serialized combination of chosen value for concept making comes in this category. Construction of value compendium on the basis of above chosen values or by organized form of serialized concepts is called organization.

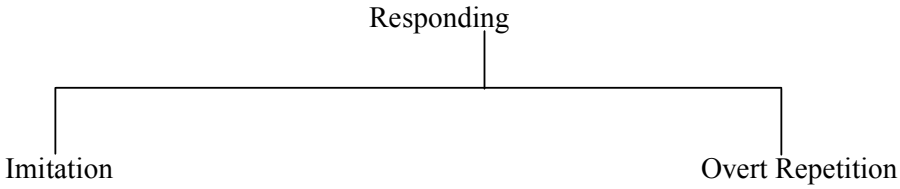
6. Characterisation: Specification of human behaviour in this reference of controlled values, thinking and conditions comes in this. In this that behaviour of students occurs in which he constructs his life-style according to value compendium.

1.4.3 OBJECTIVES OF PSYCHO-MOTOR DOMAIN

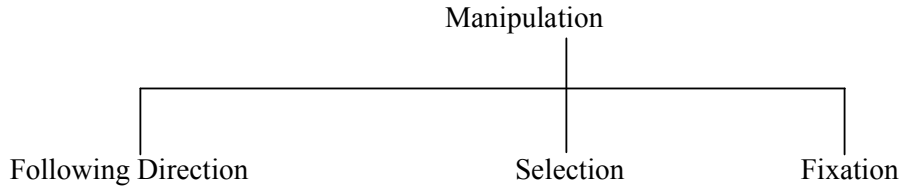
In this difference skills come. Starting from tangibility in mental form comes in skill of complex overt behaviour. Since none skill is possible in absence of co-ordination of mind and body, so it is called psycho-motor (mind and muscle) domain. In computer science teaching generally following skills are included.

i. Drawing skill
ii. Computation skill
iii. Construction skill
iv. Observation skill
v. Problem solving skill
vi. Dissection skill

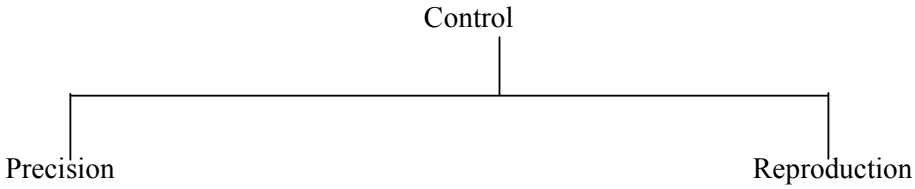
(i) Impulsion – It is first step which is needed centralized. Its two levels are



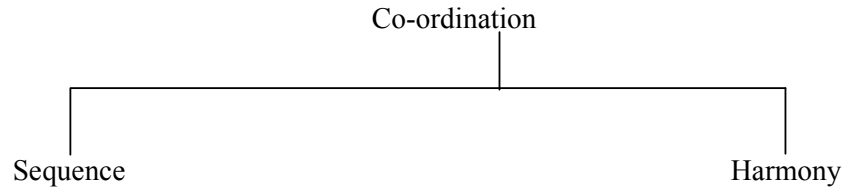
(ii) Manipulation – To organise different elements kept in any skill comes in this, following levels are in this



(iii) Control – To provide corresponding weightage to united elements comes in this. There are two levels of this



(iv) Co-ordination – Mutual relationship is co-ordination, which has following type.



B.J. Simpson gave the following levels of Psycho-motor Domain

1. Perception
2. Set
3. Guided response
4. Mechanism
5. Complex overt response.

1.4.4 CHECK YOUR PROGRESS

Note: a) Write your answers in the space given below

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

2. Name the domain where the activities of the individuals are based on heart. ----------

3.What are the objectives under cognitive domain based on Bloom's taxonomy ----------

1.5 COMPUTER SCIENCE TEACHING AT DIFFERENT LEVELS IN SCHOOLS

Science is one of those human activities that man has created to gratify certain human needs and desires. The 'Search of truth' became the dominant motive in the prosecution of science. The scientific policy resolution of the Government of India, "The domination feature of the contemporary world is the intense cultivation of science on large scale, and its application to meet the country's requirements". The primary goal of education should be the intellectual development of the individual. With its accelerating importance in our society computer science has become an increasingly important part of general knowledge. Scientific education is best fostered as a part of a general emphasis on intellectual activity. From the primary level, the

computer science teaching is given importance in the schools. Increasingly the computer science is being incorporated in the schools.

1.5.1 PRIMARY LEVEL

At primary levels, the computer is being used to display the lessons in the form of Rhymes, Games, and Browsing and Interactive mode. As per the Cognitive Development theories by Piaget and Bruner, the child learns through Senses, Icons and Enactive mode of representations. So a number of hands on experience are given to the children at this level. More over simple software applications are taught**. Ex. LOGO, MS PAINT**

1.5.2 SECONDARY LEVEL

At Secondary level, the computer skills are developed. The application soft wares like Ms Word, Excel and PowerPoint are taught. It helps to develop their fundamental computer skills which lead to higher level learning. More over computer simple programming languages are introduced at this level**. Ex. BASIC, FORTRAN.**

1.5.3 HIGHER SECONDARY LEVEL

At higher Secondary level, the computer science teaching is at high level. The programming skill based curriculum is introduced at this level. The languages like **C, C++** and **Visual Basic** and the web language like **HTML** are in the higher secondary curriculum. It helps to develop their arithmetic and logical thinking which is reflected through their programming skills.

1.5.4 CHECK YOUR PROGRESS

Note: a) Write your answers in the space given below

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

4. In which level of School Education LOGO is taught?

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5. In which level of School Education Visual Basic is taught?

1.6 THE PLACE OF COMPUTER SCIENCE IN SCHOOL CURRICULUM

As the children complete their school education, students will choose different areas of specialization. The students need to learn computer science in school for deriving the fundamental skills for their future life. As computers are used from petty shops to corporate and government offices, students ought to learn computer science. Students must be provided with skills which are central instruments for improving performance of organization across the world, be it manufacturing, service public or private. While knowledge of difference in performance is an incentive for improvements planning and improvement will require a lot of efforts and skills. The output of the school education must help our industries learn, adapt, improve and innovate. Hence computer science needs to be provided as a part of learning experience.

The 5 reasons for computer science courses to be taught at present are

1. To use electronic gadgets in all fields
2. To be on part with ever increasing societal needs and expectations.
3. To become equipped for new business and industries' dimensions
4. To be competent for local and global competitions
5. Working with finance.

The above reasons are obvious and crystal clear for any layman's understanding. But, learning computer science has its own value for one's life besides its external practicalities.

1.6.1 IMPORTANCE OF COMPUTER SCIENCE IN HIGHER SECONDARY LEVEL

The purpose of education in higher secondary schools is to provide that kind of atmosphere through which the pupils can acquire the knowledge of computer science, skills of application and the right attitude which help the pupils to be useful citizens in the society.

Also teaching of computer science in higher secondary schools should help the pupils to understand the global functioning of computer science and act locally to meet their needs. The teaching of computer science should first help the students for the following factors.

Learning of computer science provides the students to think in diversified ways and solving any computer related problems. These attitudes of solving problems should help them develop critical thinking. They should have the ability to analyze and reason out critical issues to help themselves and the society.

Pupils should develop the attitude to identify and acquire the right kind of knowledge and the skill that the society demand in the present era of technology.

Pupils must be trained to develop scientific to appreciate the technological advances and adapt it in their life.

They also must be trained to help the society by meaningful contributions which will make the society and the nation be proud of.

Using computers and the related electronic gadgets is not a single man's effort. Therefore, students need to be trained to work effectively and collaboratively as a team. Team building and team leading spirit alone can help a society to have harmony in its functions. Computer science education provided from the higher secondary schools itself will undoubtedly inculcate the caring and sharing habits among the pupils.

Solving problems, writing algorithm, codings and decordings are the basic concepts in learning computers. Hence it makes the pupils involve keen analytic skills and decision making. These kinds of decision making skills make the pupils grow into complete personalities who are mature in their words and deeds. The present intrinsic society needs only such kinds of intellectual personalities who are matured enough to understand the society.

Teachers being facilitators can understand strengths and weakness of the students. Hence when the students are helped to work with computer related problems, debug and detect the faults, the teachers can lead them and help the students identify their talents and weaknesses to fix them into the right work place. Moreover when the teachers provide their words of the variety of avenues for computer science and ICT tools, the students get the opportunity to have awareness, understand the novelty, associate their knowledge and innovate useful products. The pupils get more insights to bring out their latent talents and specific skills.

More than an intellectual person, a soft spoken and a person who has the ability to listen others are always appreciated by both the intellectuals and the illiterate people. Pupils must develop the attitude of listening to others' opinion, in spite of their confident authority and of personal strength. The must have open

mindedness to receive knowledge from the sources, calm enough to the conflicts analyses the situations in the light of the evidences and them arrive at a conclusion in a convincing way gaining the confidence of the opponent. The school environment must be able to provide such kinds of atmosphere which help the students develop the above mentioned characters, and the teacher must help the students think in the right way.

Higher secondary schools are the bridge between the school and the society. it helps for those who stop their formal education to earn a job and also serves as a ladder to these who go for higher education. Hence the teachers must provide that kind of teaching learning experiences which help the students to explore the world. The present global village warrants those skills to make the pupils to fit in the society and also for a smooth and successful life in which even career the students select. The LAN, WAN, MAN, Internet, email and forums help the students gain needed information, and have global understanding.

Students need to be proficient and professional in learning computers. They must be trained to acquire the principles of electronic devices and get the dexterity in operations.

Learning by doing method of computer science helps the students understand better and apply them in situations of need. The computer science teaching in higher secondary provides laboratory facility to promote vocational skills in the students. Students get the freedom of learning by hands on training, identify the appropriate electronic devices for their usage and become skilled users of the systems. This type of training helps them gain self confidence and help them handle the apparatus when demanded.

In such a prosperous situation, to meet the competition, inculcating vocational need in the higher secondary level itself is the demand of the era. It is the foremost responsibilities of the higher secondary school teaches and authorities to provide the needed vocational skills to their student customers.

1.6.2 COMPUTER SCIENCE TEACHING IN RELATION TO OTHER SCHOOL SUBJECTS

Computer has great influence in other school subjects. The following table explains the correlation with other school subjects.

Computer Science and Tamil

Computer Science is the key to the door of opportunity as students decide about careers, learn to make informed decisions, and function as self-motivated, lifelong learners. “Working smarter” is replacing “working harder” technically. In working smarter, individuals must be mentally fit. We are living in a time when technology is changing almost faster than we can adapt to. There is no magic formula for teaching mathematics. Using computers to practice basic skills, have benefits. Computer based exercises can raise student motivation levels. The computer’s most powerful uses are for making things visual. It can make visual abstract processes that are otherwise ineffable. If we truly want to promote excellence in mathematics education, we must consider adapting to change and using the best tools available to us. Technology plays a critical role in doing this. Using Computer Guided Learning (CGL) allows teachers to move in this direction, while being confident they have a resource correlated to the curriculum outcomes they are mandated to teach. Computer Guided Learning refers to high quality world class CD-ROM materials supported by print resources for teaching and learning.

Computer Science and Chemistry

In synthetic chemistry it is very important to know what compounds you have created. Chemists rely on spectroscopic techniques to analyse compounds they have made. Nuclear magnetic resonance, mass, infra red and ultra violet spectrometry all depend on computers to control the sensitive equipment and obtain and record detailed measurements. These analytical techniques have allowed chemists to identify the exact structure of compounds, which was previously guesswork based on observations from chemical properties. Molecular masses are known to the microgram, which would be impossible without the aid of the computer.

It is obvious that computers are important in taking measurements but they can also be used to predict measurements. There is some very powerful software available for predicting physical properties of compounds. Bond lengths, melting points, vibrational frequencies and properties such as solubility can be predicted using dedicated software based on theories known. Software like this can help you to 'design' a molecule to the specific needs of the chemist. Without the software, it would take hours of calculations to predict the properties.

Another important area of chemistry is analysing data obtained from experiments, to look for patterns to prove theories. This can be done by hand, but involves a lot of calculations, which is time consuming and liable to mistakes. Analysing data is often best done using a spreadsheet. Spreadsheets can quickly work out calculations and plot graphs showing a pictorial representation of the data more easily than any human could. Spreadsheets are usually very good at calculating the equation of a best-fit line of a graph, which is often important in chemistry.

Having used computers to obtain accurate data, it seems sensible to store it where it can easily be retrieved for reference. It could be stored on paper, filed away in alphabetical order. This is fine until the chemist wants to find data on a group of compounds such as the alcohols, or those with a melting point of over 100oC. This is where storage of the data electronically, using a database, becomes very useful. This makes the searching of data very easy for different criteria such as temperatures, solubility or mass. For example if a mass spectrum produced a parent ion mass of 175, then the database could be searched for all those with the corresponding mass to attempt to find a match. If you couldn't find the correct data in your database, could you look at someone else's? This leads me on to communications and the sharing of data.

Networks are very useful in large companies. They allow communication between different computers, and more importantly, the exchange of data. This means a company could have a central database with all the records.

Computer Science and Physics

Computers have great influence in the field of physics. Starting from Atom energy to Astronomy, the computer has deep influence. Finding weather reports, Moments of particles and their functions can be monitors through computers. Research in the field of Physics is enhanced and sophisticated by computer and its applications. Computers are used in Mechanical Engineering through **CAD, CAM, ANSYS** and **CATIA** as designing and analyzing soft wares

Computer Science and Biology. The computer science is used in Biological Science as follows

Medical Field

The use of computer technology has greatly enhanced the medical field. This is particularly so in hospital environments where reliability and quality are critical factors. Many computer applications, such as patient information systems, monitoring

and control systems and diagnostic systems, have been used to enhance healthcare.

In the hospital, patient information systems allow doctors at different locations to access permanent patient records from a centralized database. This type of computer application enables doctors and or nurses to easily find and send notices to patients who need follow up treatment/ medication. This system also allows for doctors to compare methods of treating illnesses. According to, Information Technology for CXC CSEC, this type of system also "allows fast processing of large quantities of patient data that could be used to produce useful information for management purposes".

Moreover, the computer has great influence in the field of Microbiology, Genetic Engineering and Tissue culture monitoring.

Computer Science and Social Science

Computer is used to review the past with documentary evidences. The books and all other old documents are being digitalized using computers. More over, it helps to develop new dimensions of maps and it is useful in finding natural resources using Satellites, Receivers and Sensors. Computer has great influence in developing Global Positioning System (GPS)

Computer Science and Languages

Computer science is used to develop software in languages. Computers spread the languages throughout the world.

1.6.3 CHECK YOUR PROGRESS

Note: a) Write your answers in the space given below

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

6. What is the place Computer Science in the School Curriculum?

---

7. What branch of Engineering is related with CAD?

---

8. What IS CGL?

1.7 LET US SUM UP

In this unit you have learnt the aims and objectives of teaching Computer Science. The aim of Teaching computer Science in school is to provide that kind of atmosphere through which the pupils can acquire the knowledge of computer science, skills of application and the right attitude which help the pupils to be useful citizens in the society. The main objectives of teaching computer science must ensure better match between the industry's requirement and outputs of the education sector emphasizing the quality needs. The teaching of computers should make phenomenal effects on the learners. It is complex in nature. The whole human processes can be divided in three levels .They are as as follows:

Activities related to head – Cognitive Domain

Activities related to heart – Affective Domain

Activities related to hand – Psycho-Motor Domain

on the basis of these three domains, b.s. bloom and his associates divided educational objectives . hence teacher, the facilitator must imbibe in the students the initiatives, inquiry, analytic and comprehensive abilities.

1.8 UNIT-END EXERCISE

1. What are the objectives of teaching computer Science?
2. What is the importance of teaching Computer Science?
3. Describe Bloom's taxonomy of cognitive objectives?
4. How will you teach Computer Science in the higher Secondary level?
5. How will you attain the objectives of Computer Science in the higher secondary level?

1.9 ANSWERS TO CHECK YOUR PROGRESS

1. Construct
2. Affective Domain
3. Knowledge, Understanding, Application, Analysis, Synthesis and Evaluation
4. Primary

5. Higher Secondary
6. Optional subject in Higher Secondary
7. Mechanical Engineering
8. Computer Guided Learning

1.10 SUGGESTED READINGS

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Goel, H. K. (2005). Teaching of Computer Science. New Delhi: R.Lall Book Depot.

Sharma, R. C. (1998). Modern science teaching. New Delhi: Dhanpat Raj and Sons.

Sidhu, K. S. (2006). Teaching of mathematics. New Delhi: Sterling Publishers Private Ltd.

Singh,Y. K. (2009). Teaching Practice. New Delhi: APH Publishing Corporation

UNIT II HARDWARE AND SOFTWARE OF COMPUTERS

Structure

2.1 INTRODUCTION

Computer hardware is any physical device used in or with your machine, whereas software is a collection of code installed onto your computer's hard drive. For example, the computer monitor you are using to read this text and the mouse you are using to navigate this web page is computer hardware. The Internet browser that allowed you to visit this page and the operating system that the browser is running on is considered software. In this unit, we are going to discuss the meaning and definitions of computers, hardware, software, network communication and use of computers in schools .

2.2. OBJECTIVES

After studying this unit, you will be able to

- Define computers
- Understand the hardware components of Computers
- Explain the network communication
- Trace the history of computers
- Identify the Computer Viruses and uses the protective measures
- Classify the different types of software
- Understand the high level programming languages
- Explain the uses of computers in schools

2.3 DEFINITION OF COMPUTERS

Computers is a device, which can compute. It is an electronic device, which works under a set of instructions automatically accepts the supplied data, process and analyzes the data and produces the information. The first fully electronic computers, introduced in the 1940s, were huge machines that required teams of people to operate. But now a days we have most advanced machines which perform number of calculations within the fraction of time.

Computers work through an interaction of hardware and software. Hardware refers to the parts of a computer that you can see and touch, including the case and everything inside it. The most important piece of hardware is a tiny rectangular chip inside your computer called the central processing unit (CPU), or microprocessor. It's

the "brain" of your computer—the part that translates instructions and performs calculations. Hardware items such as your monitor, keyboard, mouse, printer, and other components are often called hardware devices, or devices.

Software refers to the instructions, or programs, that tell the hardware what to do. A word processing program that you can use to write letters on your computer is a type of software. The operating system (OS) is software that manages your computer and the devices connected to it. Two well-known operating systems are Windows and Macintosh operating system. Your computer uses the Windows operating system.

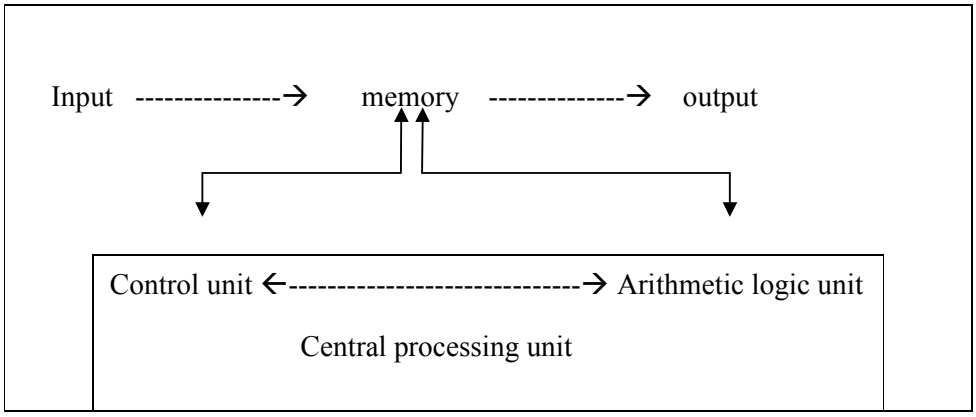
2.3.1 HARDWARE COMPONENTS OF COMPUTERS

The main parts of the computer are as follows

A) Cent

It is c ithmetic and Log ites the instructi

Computers are made up of many parts. These different parts perform one or more functions including input, output, processing, or storage.



a) Arithmetic and Logic Unit (ALU)

This unit performs a number of arithmetic operations such as, addition, subtraction etc. and also performs the logical operations.

b) Control Unit

The control unit controls the entire operations of all the units of a computer. It brings one instruction at a time from the memory, interprets it and obeys it by coordinating the working of all the other units. In other words, this unit is considered to be the nervous system of a computer. All the commands are regulated and controlled by this unit.

c) Memory Unit

This unit consists of locations or cells on which the data can be stored. If you want to retrieve the data, the data can be retrieved from the same unit. This unit consists of two types of memories viz. permanent memory and secondary or auxiliary memory. A permanent memory is nothing but the semiconductor memory device available within the computer. Hard disk is an example for permanent memory device. The secondary memory is the memory which is movable and can be taken away from the computer and can be kept safely. Floppy disks, compact discs and memory sticks are the examples of secondary memory devices.

B) Output Devices

Output devices send information from your computer to you. This information is usually in the form of sound and sight, but some devices can send information as touch and even as smell! Some common output devices are monitors, printers, and speakers.

C) Input Devices

Input devices are the parts that let you enter and manipulate information on a computer. These devices range from the standard keyboard and mouse, to scanners, microphones, joysticks, and light pens.

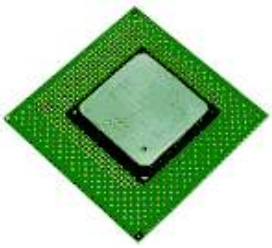
Note:

There are some devices that can input and output. Some examples would touch screen monitors (input by touch, output by sight) and force feedback joysticks.

D) Inside a System

The inside of your computer has many parts that all work together. These parts are generally found within your computer case - this is usually the big "box" that probably sits under your desk or below your monitor. If you're using an iMac, many of the computer parts are built into the monitor case.

The **motherboard** or main board is the backbone of the computer. All the individual pieces connect to the motherboard in some way. The motherboard is home the processor chip, PCI slots, and memory.



Processor - This is the chip that does the "thinking" of the computer. These are the "Pentium" and "AMD" chips you hear about. Processor speed is measured in Megahertz (MHz) and Gigahertz (GHz). 1 GHz = 1000 MHz

Memory - This is where information is temporarily stored for the processor to use and manipulate before storing on the HARD DRIVE. Also known as RAM (Random access memory). Information is stored in memory only when the computer is turned on. RAM is measured in Megabytes (Mb), which is storage capacity, not to be confused with Megahertz, which is speed.

PCI Slot - These are outlets in the motherboard that allow you to install extra components like sound cards, modems, video cards, and other devices. The images below show different PCI card components.

Hard Drive - This is the part of your computer where information is stored for later retrieval. All the information you access on your computer, all your documents, pictures, email messages, and programs are here. Unlike memory, the hard drive stores information even after the power is turned off. The image to the right shows the inside of a hard drive.

Floppy Drive - This is the slot in the front of your computer where you insert a disk to store data and move it to another computer. If your computer is an iMac, you will not have a Floppy Drive. Floppy disks are 3¼ inches in size, and hold 1.44Mb of data. The images below show a floppy drive, and some floppy disks.

CD ROM or DVD ROM Drives - This plays your music and data CDs, or if you have a DVD drive, it will also play DVD movies. Data CD's hold up to 700Mb of information. If you have a CD-R or CD-RW drive, you can store your own information on CDs.

2.3.2 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with the given answers at the end of the unit .

1.The set of instructions for the computers to run is____

2. The part of your computer where information is stored for later retrieval is ___

3. The chip that does the "thinking" of the computer is_____

4. RAM is measured in ____

5. The parts that let you enter and manipulate information on a computer is___

2.4 HISTORY OF COMPUTERS

The history of computer development is often in reference to the different *generations of computing devices*. Each of the five generations of computers is characterized by a *major technological development* that fundamentally changed the way computers operate. Most developments resulted in increasingly smaller, cheaper

and more powerful and efficient computing devices. The history and development of the computers are given below.

First Generation Computers

The first electronic computer came into use at the end of II World War. Development of this machine was started in 1943 and was completed in 1946. This electronic computer was known as ENIVAC (Electronic Numerical Integrator and Calculator) and was designed by Dr. Presper Eckert and Dr. John Mauchley. It contained approximately 18500 vacuum tubes, 70000 resistors and 10000 capacitors and weighed about 30 tonnes. It also consumed a large amount of electrical power, considerable space and a large amount of money.

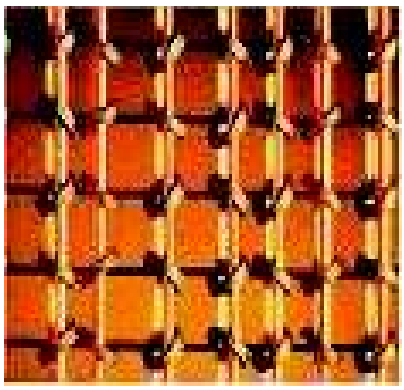
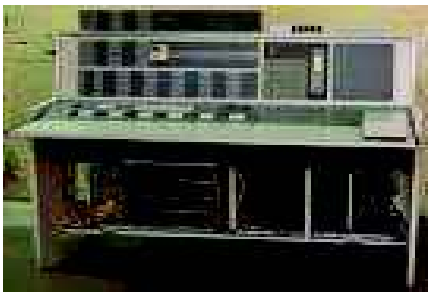


Figure 12-1 An Abacus

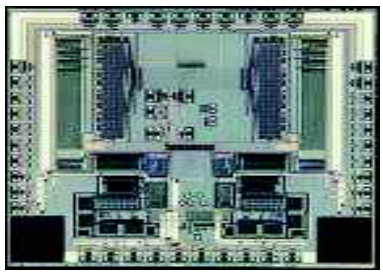
Second Generation Computers

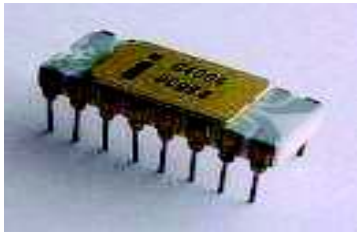
In this generation, the large bulky vacuum tubes were replaced with the much smaller transistors. This major technological advancement was developed by scientists of Bell Laboratories in 1948. The transistors were not only smaller in size but also more reliable and consumed less energy, besides reducing the size of the computers considerably. Also second generation computers used high level programming languages. Another additional feature of second generation computers was the development of random access storage devices, through which the information could be recorded or retrieved from a storage medium irrespective of the sequential order of the stored information.



Third Generation Computers

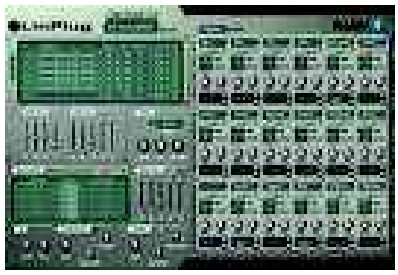
The third generation of computer began in 1960, after the Invention of integrated circuit or chip. This chip was a one-quarter inch-square piece of material on which thousands of electronic circuits (replacements for vacuum tubes, transistors, resistors and capacitors) could be implanted. This is considered to be the backbone of today's modern electronic computers.





Fourth Generation Computers

This generation of computers was characterized by the development of microprocessor or a microchip in 1970. Approximately 70,000 or more vacuum tube equivalents or transistors could be embedded in a single chip of this kind. They were very powerful in terms of the speed of processing and memory. They were otherwise known as "computers on a chip".



Fifth Generation Computers

The fifth generation computer of 1990s was much faster and more powerful and perhaps intelligent enough to process information and draw conclusions like human beings. Therefore this generation of computer is characterized by "Artificial Intelligence".

Because of the rapid growth of technological advancements in computer, no one can predict what the future will bring. It is certain that computers will continue to evolve and will bring about significant changes in our lives in future.

The development of computers is given as follows.

The computer was born not for entertainment or email but out of a need to solve a serious number-crunching crisis. By 1880, the U.S. population had grown so large that it took more than seven years to tabulate the U.S. Census results. The government sought a faster way to get the job done, giving rise to punch-card based computers that took up entire rooms.

Today, we carry more computing power on our smartphones than was available in these early models. The following brief history of computing is a timeline of how computers evolved from their humble beginnings to the machines of today that surf the Internet, play games and stream multimedia in addition to crunching numbers.

1801: In France, Joseph Marie Jacquard invents a loom that uses punched wooden cards to automatically weave fabric designs. Early computers would use similar punch cards.

1822: English mathematician Charles Babbage conceives of a steam-driven calculating machine that would be able to compute tables of numbers. The project, funded by the English government, is a failure. More than a century later, however, the world's first computer was actually built.

1890: Herman Hollerith designs a punch card system to calculate the 1880 census, accomplishing the task in just three years and saving the government $5 million. He establishes a company that would ultimately become IBM.

1936: Alan Turing presents the notion of a universal machine, later called the Turing machine, capable of computing anything that is computable. The central concept of the modern computer was based on his ideas.

1937: J.V. Atanasoff, a professor of physics and mathematics at Iowa State University, attempts to build the first computer without gears, cams, belts or shafts.

1941: Atanasoff and his graduate student, Clifford Berry, design a computer that can solve 29 equations simultaneously. This marks the first time a computer is able to store information on its main memory.

1943-1944: Two University of Pennsylvania professors, John Mauchly and J. Presper Eckert, build the Electronic Numerical Integrator and Calculator (ENIAC). Considered the grandfather of digital computers, it fills a 20-foot by 40-foot room and has 18,000 vacuum tubes.

1946: Mauchly and Presper leave the University of Pennsylvania and receive funding from the Census Bureau to build the UNIVAC, the first commercial computer for business and government applications.

1947: William Shockley, John Bardeen and Walter Brattain of Bell Laboratories invent the transistor. They discovered how to make an electric switch with solid materials and no need for a vacuum.

1953: Grace Hopper develops the first computer language, which eventually becomes known as COBOL. Thomas Johnson Watson Jr., son of IBM CEO Thomas Johnson Watson Sr., conceives the IBM 701 EDPM to help the United Nations keep tabs on Korea during the war.

1954: The FORTRAN programming language is born.

1958: Jack Kilby and Robert Noyce unveil the integrated circuit, known as the computer chip. Kilby was awarded the Nobel Prize in Physics in 2000 for his work.

1964: Douglas Engelbart shows a prototype of the modern computer, with a mouse and a graphical user interface (GUI**)**. This marks the evolution of the computer from a specialized machine for scientists and mathematicians to technology that is more accessible to the general public.

1969: A group of developers at Bell Labs produce UNIX, an operating system that addressed compatibility issues. Written in the C programming language, UNIX was portable across multiple platforms and became the operating system of choice among mainframes at large companies and government entities. Due to the slow nature of the system, it never quite gained traction among home PC users.

1970: The newly formed Intel unveils the Intel 1103, the first Dynamic Access Memory (DRAM) chip.

1971: Alan Shugart leads a team of IBM engineers who invent the "floppy disk," allowing data to be shared among computers.

1973: Robert Metcalfe, a member of the research staff for Xerox, develops Ethernet for connecting multiple computers and other hardware.

1974-1977: A number of personal computers hit the market, including Scelbi & Mark-8 Altair, IBM 5100, RadioShack's TRS-80 —affectionately known as the "Trash 80" — and the Commodore PET.

1975: The January issue of Popular Electronics magazine features the Altair 8080, described as the "world's first minicomputer kit to rival commercial models." Two "computer geeks," Paul Allen and Bill Gates, offer to write software for the Altair, using the new BASIC language. On April 4, after the success of this first endeavor, the two childhood friends form their own software company, Microsoft.

1976: Steve Jobs and Steve Wozniak start Apple Computers on April Fool's Day and roll out the Apple I, the first computer with a single-circuit board.

1977: Radio Shack's initial production run of the TRS-80 was just 3,000. It sold like crazy. For the first time, non-geeks could write programs and make a computer do what they wished.

1977: Jobs and Wozniak incorporate Apple and show the Apple II at the first West Coast Computer Faire. It offers color graphics and incorporates an audio cassette drive for storage.

1978: Accountants rejoice at the introduction of VisiCalc, the first computerized spreadsheet program.

1979: Word processing becomes a reality as MicroPro International releases WordStar.

1981: The first IBM personal computer, code-named "Acorn," is introduced. It uses Microsoft's MS-DOS operating system. It has an Intel chip, two floppy disks and an optional color monitor. Sears & Roebuck and Computerland sell the machines, marking the first time a computer is available through outside distributors. It also popularizes the term PC.

1983: Apple's Lisa is the first personal computer with a GUI. It also features a drop-down menu and icons. It flops but eventually evolves into the Macintosh. The Gavilan SC is the first portable computer with the familiar flip form factor and the first to be marketed as a "laptop."

1985: Microsoft announces Windows, its response to Apple's GUI. Commodore unveils the Amiga 1000, which features advanced audio and video capabilities.

1985: The first dot-com domain name is registered on March 15, years before the World Wide Web would mark the formal beginning of Internet history. The Symbolics Computer Company, a small Massachusetts computer manufacturer, registers Symbolics.com. More than two years later, only 100 dot-coms had been registered.

1986: Compaq brings the Deskpro 386 to market. Its 32-bit architecture provides as speed comparable to mainframes.

1990: Tim Berners-Lee, a researcher at CERN, the high-energy physics laboratory in Geneva, develops HyperText Markup Language (HTML), giving rise to the World Wide Web.

1993: The Pentium microprocessor advances the use of graphics and music on PCs.

1994: PCs become gaming machines as "Command & Conquer," "Alone in the Dark 2," "Theme Park," "Magic Carpet," "Descent" and "Little Big Adventure" are among the games to hit the market.

1996: Sergey Brin and Larry Page develop the Google search engine at Stanford University.

1997: Microsoft invests $150 million in Apple, which was struggling at the time, ending Apple's court case against Microsoft in which it alleged that Microsoft copied the "look and feel" of its operating system.

1999: The term Wi-Fi becomes part of the computing language and users begin connecting to the Internet without wires.

2001: Apple unveils the Mac OS X operating system, which provides protected memory architecture and pre-emptive multi-tasking, among other benefits. Not to be outdone, Microsoft rolls out Windows XP, which has a significantly redesigned GUI.

2003: The first 64-bit processor, AMD's Athlon 64, becomes available to the consumer market.

2004: Mozilla's Firefox 1.0 challenges Microsoft's Internet Explorer, the dominant Web browsers. Facebook, a social networking site, launches.

2005: YouTube, a video sharing service, is founded. Google acquires Android, a Linux-based mobile phone operating system.

2006: Apple introduces the MacBook Pro, its first Intel-based, dual-core mobile computer, as well as an Intel-based iMac. Nintendo's Wii game console hits the market.

2007: The iPhone brings many computer functions to the smartphone.

2009: Microsoft launches Windows 7, which offers the ability to pin applications to the taskbar and advances in touch and handwriting recognition, among other features.

2010: Apple unveils the iPad, changing the way consumers view media and jumpstarting the dormant tablet computer segment.

2011: Google releases the Chromebook, a laptop that runs the Google Chrome OS.

2012: Facebook gains 1 billion users on October 4.

2015: Apple releases the Apple Watch. Microsoft releases Windows 10.

2 4.1 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with the given answers at the end of the unit .

6. The world's first computer was discovered by _____
7. The Punch card system for calculation was introduced by_____
8. YouTube, a video sharing service, was founded in the year_____
9. Hyper Text Markup Language (HTML) was developed by_____
10. Microsoft Windows 7 was introduced in the year_____
11. The FORTRAN programming language was born in the year_____.
12. The fifth generation of computer is characterized by _____

2.5 TYPES OF COMPUTERS

Computers differ based on their data processing abilities. They are classified according to purpose, data handling and functionality. According to purpose, computers are either general purpose or specific purpose. **General purpose computers** are designed to perform a range of tasks. They have the ability to store numerous programs, but lack in speed and efficiency. Specific purpose computers are designed to handle a specific problem or to perform a specific task. A set of instructions is built into the machine. According to data handling, computers are analog, digital or hybrid. Analog computers work on the principle of measuring, in which the measurements obtained are translated into data. Computers differ based on their data processing abilities. They are classified according to purpose, data handling and functionality. According to purpose, computers are either general purpose or specific purpose. **General purpose computers** are designed to perform a range of tasks. They have the ability to store numerous programs, but lack in speed and efficiency. Specific purpose computers are designed to handle a specific problem or to perform a specific task. A set of instructions is built into the machine.

According to data handling, computers are analog, digital or hybrid. Analog computers work on the principle of measuring, in which the measurements obtained are translated into data. Modern analog computers usually employ electrical parameters, such as voltages, resistances or currents, to represent the quantities being manipulated. Such computers do not deal directly with the numbers

The computers may be classified into three types viz,

a) Analog b) Digital and c) Hybrid Computers

Depending upon the use of the computer again we have two more important types of computers, viz. i) Real Time Computer and ii) Process Control Computer.

Analog Computers

Computers, which operate by measuring continuously varying quantities like voltage and current for their operations are called Analog Computers. These computers use only electronic pulses. The number and arithmetic operations are carried out electrically using signal amplifiers. They operate on the principle of creating a physical analogy of the mathematical problem.

Digital Computers

Computers, which deal with only numbers and digits are called Digital Computers. These computers perform only addition and the remaining operations like multiplication, division, subtraction etc are performed by means of repeated additions. They have very high accuracy and the results are available only after the entire computation process is over. All the mathematical calculations are carried out by means of binary digits, i.e., Os and Is.

Hybrid Computers

Hybrid Computers are nothing but the computers that emerged out the combination of digital and analog computers. Example for Hybrid computers is a computer which monitors weather conditions and output

Analog versus Digital Computers

Analog Computers	Digital Computers
Physical analogy of the problems is required	Physical analogy of the problems is not required
They operate by the measurement of continuously varying quantities	They operate by counting.
Here problems are converted into equations and then into electrical signals	Here problems are converted into BITS (0s and 1s)
They give results in the graphical form.	They give results in the discrete
Accuracy is less.	Accuracy is more
They have limited applications.	They have a lot of applications

2.5.1 CHARACTERISTICS OF A DIGITAL COMPUTER

A digital computer has the following characteristics.

1. Speed

Computers are really very fast in their working. In a fraction of a second, they can do millions of arithmetical operations (speed may vary from computer to computer). Because of this property, bus, railway and airline reservations are being done very quickly with the help of computers.

2. Accuracy

In addition to speed, computers are also accurate in their output. If the data are fed correctly to the computer, the output result will be accurate and free from errors.

3. Storage Capacity

Computer has the facility to store large volume of data and other instructions and the data can also be retrieved whenever we need them. This storage capacity or "Computer Memory" is expressed as a unit called "kilobyte" ("K")l K = 1024 bytes.

4. Repetitiveness

A computer has the ability to perform a task given to it as many times as one desires. For example, if we wish to do arithmetic computation ten million times, the computer will do that task without any hesitation. Moreover, even the last computation will be done with the same accuracy and speed as the first one.

5. Versatility

Computers have the capability to perform almost any task using a proper set of instructions, otherwise called programs. Even for a computer with lesser memory, the instructions need not be many in number.

6. Automatism

A computer will perform the required tasks until it meets the "stop" instruction in the program. This means that once the computer has started the process of executing a program, it will continue to work, until the program is terminated.

Computers can be generally classified by **size and power** as follows, though there is considerable overlap:

- Personal computer: A small, single-user computer based on a microprocessor.
- Workstation: A powerful, single-user computer. A workstation is like a personal computer, but it has a more powerful microprocessor and, in general, a higher-quality monitor.
- Minicomputer: A multi-user computer capable of supporting up to hundreds of users simultaneously.
- Mainframe: A powerful multi-user computer capable of supporting many hundreds or thousands of users simultaneously.
- Supercomputer: An extremely fast computer that can perform hundreds of millions of instructions per second.

Supercomputer and Mainframe

Supercomputer is a broad term for one of the fastest computers currently available. Supercomputers are very expensive and are employed for specialized applications that require immense amounts of mathematical calculations (number crunching). For example, weather forecasting requires a supercomputer. Other uses of

supercomputers scientific simulations, (animated) graphics, fluid dynamic calculations, nuclear energy research, electronic design, and analysis of geological data (e.g. in petrochemical prospecting). Perhaps the best known supercomputer manufacturer is Cray Research.

Mainframe was a term originally referring to the cabinet containing the central processor unit or "main frame" of a room-filling Stone Age batch machine. After the emergence of smaller "minicomputer" designs in the early 1970s, the traditional big iron machines were described as "mainframe computers" and eventually just as mainframes. Nowadays a Mainframe is a very large and expensive computer capable of supporting hundreds, or even thousands, of users simultaneously. The chief difference between a supercomputer and a mainframe is that a supercomputer channels all its power into executing a few programs as fast as possible, whereas a mainframe uses its power to execute many programs concurrently. In some ways, mainframes are more powerful than supercomputers because they support more simultaneous programs. But supercomputers can execute a single program faster than a mainframe. The distinction between small mainframes and minicomputers is vague, depending really on how the manufacturer wants to market its machines.

Minicomputer

It is a midsize computer. In the past decade, the distinction between large minicomputers and small mainframes has blurred, however, as has the distinction between small minicomputers and workstations. But in general, a minicomputer is a multiprocessing system capable of supporting from up to 200 users simultaneously.

Workstation

It is a type of computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other types of applications that require a moderate amount of computing power and relatively high quality graphics capabilities. Workstations generally come with a large, high-resolution graphics screen, at large amount of RAM, built-in network support, and a graphical user interface. Most workstations also have a mass storage device such as a disk drive, but a special type of workstation, called a diskless workstation, comes without a disk drive. The most common operating systems for workstations are UNIX and Windows NT. Like personal computers, most workstations are single-user computers. However, workstations are typically linked together to form a local-area network, although they can also be used as stand-alone systems.

N.B.: In networking, workstation refers to any computer connected to a local-area network. It could be a workstation or a personal computer.

Personal computer

It can be defined as a small, relatively inexpensive computer designed for an individual user. In price, personal computers range anywhere from a few hundred pounds to over five thousand pounds. All are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is for playing games and recently for surfing the Internet.

Personal computers first appeared in the late 1970s. One of the first and most popular personal computers was the Apple II, introduced in 1977 by Apple Computer. During the late 1970s and early 1980s, new models and competing operating systems seemed to appear daily. Then, in 1981, IBM entered the fray with its first personal computer, known as the IBM PC. The IBM PC quickly became the personal computer of choice, and most other personal computer manufacturers fell by the wayside. P.C. is short for personal computer or IBM PC. One of the few companies to survive IBM's onslaught was Apple Computer, which remains a major player in the personal computer marketplace. Other companies adjusted to IBM's dominance by building IBM clones, computers that were internally almost the same as the IBM PC, but that cost less. Because IBM clones used the same microprocessors as IBM PCs, they were capable of running the same software. Over the years, IBM has lost much of its influence in directing the evolution of PCs. Therefore after the release of the first PC by IBM the term PC increasingly came to mean IBM or IBM-compatible personal computers, to the exclusion of other types of personal computers, such as Macintoshes. In recent years, the term PC has become more and more difficult to pin down. In general, though, it applies to any personal computer based on an Intel microprocessor, or on an Intel-compatible microprocessor. For nearly every other component, including the operating system, there are several options, all of which fall under the rubric of PC.

Today, the world of personal computers is basically divided between Apple Macintoshes and PCs. The principal characteristics of personal computers are that they are single-user systems and are based on microprocessors. However, although personal computers are designed as single-user systems, it is common to link them

together to form a network. In terms of power, there is great variety. At the high end, the distinction between personal computers and workstations has faded. High-end models of the Macintosh and PC offer the same computing power and graphics capability as low-end workstations by Sun Microsystems, Hewlett-Packard, and DEC.

Personal Computer Types

Actual personal computers can be generally classified by size and chassis / case. The chassis or case is the metal frame that serves as the structural support for electronic components. Every computer system requires at least one chassis to house the circuit boards and wiring. The chassis also contains slots for expansion boards. If you want to insert more boards than there are slots, you will need an expansion chassis, which provides additional slots. There are two basic flavors of chassis designs–desktop models and tower models–but there are many variations on these two basic types. Then come the portable computers that are computers small enough to carry. Portable computers include notebook and subnotebook computers, hand-held computers, palmtops, and PDAs.

Tower model

The term refers to a computer in which the power supply, motherboard, and mass storage devices are stacked on top of each other in a cabinet. This is in contrast to desktop models, in which these components are housed in a more compact box. The main advantage of tower models is that there are fewer space constraints, which makes installation of additional storage devices easier.

Desktop model

A computer designed to fit comfortably on top of a desk, typically with the monitor sitting on top of the computer. Desktop model computers are broad and low, whereas tower model computers are narrow and tall. Because of their shape, desktop model computers are generally limited to three internal mass storage devices. Desktop models designed to be very small are sometimes referred to as **slimline models**.

Notebook computer

An extremely lightweight personal computer. Notebook computers typically weigh less than 6 pounds and are small enough to fit easily in a briefcase. Aside from size, the principal difference between a notebook computer and a personal computer is the display screen. Notebook computers use a variety of techniques, known as flat-panel technologies, to produce a lightweight and non-bulky display screen. The quality of notebook display screens varies considerably. In terms of computing power,

modern notebook computers are nearly equivalent to personal computers. They have the same CPUs, memory capacity, and disk drives. However, all this power in a small package is expensive. Notebook computers cost about twice as much as equivalent regular-sized computers. Notebook computers come with battery packs that enable you to run them without plugging them in. However, the batteries need to be recharged every few hours.

Laptop computer

A small, portable computer -- small enough that it can sit on your lap. Nowadays, laptop computers are more frequently called notebook computers.

Subnotebook computer

A portable computer that is slightly lighter and smaller than a full-sized notebook computer. Typically, subnotebook computers have a smaller keyboard and screen, but are otherwise equivalent to notebook computers.

Hand-held computer

A portable computer that is small enough to be held in one's hand. Although extremely convenient to carry, handheld computers have not replaced notebook computers because of their small keyboards and screens. The most popular hand-held computers are those that are specifically designed to provide PIM (personal information manager) functions, such as a calendar and address book. Some manufacturers are trying to solve the small keyboard problem by replacing the keyboard with an electronic pen. However, these pen-based devices rely on handwriting recognition technologies, which are still in their infancy. Hand-held computers are also called PDAs, palmtops and pocket computers.

Palmtop

A small computer that literally fits in your palm. Compared to full-size computers, palmtops are severely limited, but they are practical for certain functions such as phone books and calendars. Palmtops that use a pen rather than a keyboard for input are often called hand-held computers or PDAs. Because of their small size, most palmtop computers do not include disk drives. However, many contain PCMCIA slots in which you can insert disk drives, modems, memory, and other devices. Palmtops are also called PDAs, hand-held computers and pocket computers.

PDA

Short for personal digital assistant, a handheld device that combines computing, telephone/fax, and networking features. A typical PDA can function as a cellular phone, fax sender, and personal organizer. Unlike portable computers, most PDAs are pen-based, using a stylus rather than a keyboard for input. This means that they also incorporate handwriting recognition features. Some PDAs can also react to voice input by using voice recognition technologies. The field of PDA was pioneered by Apple Computer, which introduced the Newton Message Pad in 1993. Shortly thereafter, several other manufacturers offered similar products. To date, PDAs have had only modest success in the marketplace, due to their high price tags and limited applications. However, many experts believe that PDAs will eventually become common gadgets. PDAs are also called palmtops, hand-held computers and pocket computers.

2 5.2 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with the given answers at the end of the unit.

13.The computers work on the principle of measuring, in which the measurements obtained are translated into data is called_____

14. An extremely lightweight personal computer is _____

15. Desktop models designed to be very small are referred to as _

16 A small, single-user computer based on a microprocessor_____

2.6 COMPUTER NETWORK

A computer network is interconnection of various computer systems located at different places. In computer network two or more computers are linked together with a medium and data communication devices for the purpose of communicating data and sharing resources. The computer that provides resources to other computers on a network is known as server. In the network the individual computers, which access shared network resources, are known as nodes.

2.6.1 CHARACTERISTICS OF A COMPUTER NETWORK

The primary purpose of a computer network is to share resources:

1. You can play a CD music from one computer while sitting on another computer.
2. You may have a computer that doesn't have a DVD player. In this case, you can place a movie disc (DVD) on the computer that has the player, and then view the movie on a computer that lacks the player .
3. You may have a computer with a CD/DVD/ writer or a backup system but the other computer doesn't have it. In this case, you can burn discs or make backups on a computer that has one of these but using data from a computer that doesn't have a disc writer or a backup system
4. You can connect a printer (or a scanner, or a fax machine) to one computer and let other computers of the network print (or scan, or fax) to that printer (or scanner, or fax machine).
5. You can place a disc with pictures on one computer and let other computers access those pictures 5. You can create files and store them in one computer, then access those files from the other computer(s) connected to it.

2.6.2 CONCEPT OF NETWORKING

A computer network, often simply referred to as a network, is a collection of hardware components and computers interconnected by communication channels that allow sharing of resources and information. Networks may be classified according to a wide variety of characteristics such as the medium used to transport the data, communications protocol used, scale, topology, and organizational scope. The rules and data formats for exchanging information in a computer network are defined by communications protocols.

2.6.3 PROPERTIES OF NETWORK

1. Facilitate communications

Using a network, people can communicate efficiently and easily via email, instant messaging, chat rooms, telephone,video telephone calls, and video conferencing.

2. Permit sharing of files, data, and other types of information

In a network environment, authorized users may access data and information stored on other computers on the network. The capability of providing access to data and information on shared storage devices is an important feature of many networks.

3. Share network and computing resources

In a networked environment, each computer on a network may access and use resources provided by devices on the network, such as printing a document on a shared network

printer. Distributed computing uses computing resources across a network to accomplish tasks.

2.6.4 BENEFITS OF NETWORK

1. **File sharing**: Network file sharing between computers gives you more flexibity than using floppy drives or Zip drives. Not only can you share photos, music files, and documents, you can also use a home network to save copies of all of your important data on a different computer. Backups are one of the most critical yet overlooked tasks in home networking.

2. **Printer / peripheral sharing:** Once a home network is in place, it's then easy to set up all of the computers to share a single printer. No longer will you need to bounce from one system or another just to print out an email message. Other computer peripherals can be shared similarly such as network scanners, Web cams, and

CD burners.

3. **Internet connection sharing:** Using a home network, multiple family members can access the Internet simultaneously without having to pay an ISP for multiple accounts. You will notice the Internet connection slows down when several people share it, but broadband Internet can handle the extra load with little trouble.

4. **Multi-player games**: Many popular home computer games support LAN mode where friends and family can play together, if they have their computers networked.

5. **Internet telephone service**: Voice over IP (VoIP) services allows you to make and receive phone calls through your home network across the Internet.

6. **Home entertainment:** Newer home entertainment products such as digital video recorders (DVRs) and video game consoles now support either wired or wireless home networking. Having these products

integrated into your network enables online Internet gaming, video sharing and other advanced features.

2.6.5 TYPES OF NETWORKS

There are many different types of networks. However, from an end user's point of view there are three basic types:

1. Local Area Network

2. Wide Area Network

3. Metropolitan Area Network

1. Local Area Network (LAN):

A local area network (LAN) supplies networking capability to a group of computers in close proximity to each other such as in an office building, a school, or a home. A LAN is useful for sharing resources like files, printers, games or other applications. A LAN in turn often connects to other LANs, and to the Internet or other WAN.Most local area networks are built with relatively inexpensive hardware such as Ethernet cables, network adapters, and hubs.

Wireless LAN and other more advanced LAN hardware options also exist. LAN is a computer network that spans a relatively small area. Most LANs are confined to a single building or group of buildings. However, one LAN can be connected to other LANs over any distance via telephone lines and radio waves. Most LANs connect workstations and personal computers. Each node (individual computer) in a LAN has its own CPU with which it executes programs, but it is also able to access data and devices anywhere on the LAN. This means that many users can share expensive devices, such as laser printers, as well as data. Users can also use the LAN to communicate with each other, by sending e-mail or engaging in chat sessions. There are many different types of LANs-tokenring networks, Ethernets, and ARCnets being the most common for PCs.

2. Wide Area Networks (WANs)

The term Wide Area Network (WAN) usually refers to a network which covers a large geographical area, and use communications circuits to connect the intermediate nodes. A major factor impacting WAN design and performance is a requirement that they lease communications circuits from telephone companies or other communications carriers.

Transmission rates are typically 2 Mbps, 34 Mbps, 45 Mbps, 155 Mbps, 625 Mbps (or sometimes considerably more).

3. Metropolitan Area Network (MAN)

A Metropolitan Area Network (MAN) is one of a number of types of networks (see also LAN and WAN). A MAN is a relatively new class of network, it serves a role similar to an ISP, but for corporate users with large LANs.

Important terms used in Networking

Voice Messaging

It is a new communication approach which is similar to electronic mail except that it is audio message rather than text messages that are processed. A sender speaks into a telephone rather than typing, giving the name of the recipient and the message. That sender's voice signal is then digitized and stored. The system can then either deliver the message at a specified time in future or it can be retrieved from a database by the recipient. The message is reconverted back into its analog format when it is delivered or retrieved so that the recipient hears it as the original sender's voice on a telephone. Voice messaging requires a computer with an ability to store the audio messages in digital form and then convert them back in an audio form upon verification. Each user has a voice mailbox in secondary storage and special equipment converts the audio message to and from the digital form. The main advantage of voice mail over electronic mail is that the sender does not have to type. Voice mail also makes it easy to include people in the firm's environment in a communication network.

Hub

A hub is typically the least expensive, least intelligent, and least complicated. Its job is very simple: anything that comes in one port is sent out to the others. Every computer connected to the hub "sees" everything that every other computer on the hub sees. The hub itself is blissfully ignorant of the data being transmitted. For years, simple hubs have been quick and easy ways to connect computers in small networks.

Switch

A switch does essentially what a hub does but more efficiently. By paying attention to the traffic that comes across it, it can "learn" where particular addresses are. For example, if it sees traffic from machine A coming in on port 2, it now knows that machine A is connected to that port and that traffic to machine A needs to only be sent to that port and not any of the others. The net result of using a switch over a hub is that most of the network traffic only goes where it needs to rather than to every port. On busy networks this can make the network significantly faster.

Router

A router is the smartest and most complicated of the bunch. Routers come in all shapes and sizes from the small four-port broadband routers that are very popular right now to the large industrial strength devices that drive the internet itself. A simple

way to think of a router is as a computer that can be programmed to understand, possibly manipulate, and route the data its being asked to handle. For example, broadband routers include the ability to "hide" computers behind a type of firewall which involves slightly modifying the packets of network traffic as they traverse the device. All routers include some kind of user interface for configuring how the router will treat traffic. The really large routers include the equivalent of a full-blown programming language to describe how they should operate as well as the ability to communicate with other routers to describe or determine the best way to get network traffic from point A to point B.

Network Repeater

A repeater connects two segments of your network cable. It retimes and regenerates the signals to proper amplitudes and sends them to the other segments. When talking about, Ethernet are probably talking about using a hub as a repeater. Repeaters require a small amount of time to regenerate the signal. This can cause a propagation delay which can affect network communication when there are several repeaters in a row. Many network architectures limit the number of repeaters that can be used in a row. Repeaters work only at the physical layer of the OSI network model.

Bridge

A bridge reads the outermost section of data on the data packet,to tell where the message is going. It reduces the traffic on other network segments, since it does not send all packets. Bridges can be programmed to reject packets from particular networks. Bridging occurs at the data link layer of the OSImodel, which means the bridge cannot read IP addresses, but only the outermost hardware address of the packet. In our case the bridge can read the ethernet data which gives the hardware address of the destination address, not the IP address. Bridges forward all broadcast messages. Only a special bridge called a translation bridge will allow two networks of different architectures to be connected. Bridges do not normally allow connection of networks with different architectures. The hardware address is also called the MAC (media access control) address. To determine the network segment a MAC address belongs to, bridges use one of the following:

1.**Transparent Bridging:** They build a table of addresses (bridging table) as they receive packets. If the address is not in the bridging table, the packet is forwarded to all segments other than the one it came from. This type of bridge is used on ethernet networks.

2. **Source route bridging:** The source computer provides path information inside the packet. This is used on Token Ring networks.

Gateway

A gateway can translate information between different network data formats or network architectures. It can translate TCP/IP to AppleTalk so computers supporting TCP/IP can communicate with Apple brand computers. Most gateways operate at the application layer, but can operate at the network or session layer of the OSI model. Gateways will start at the lower level and strip information until it gets to the required level and repackage the information and work its way back toward the hardware layer of the OSI model.

2 6.6 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with the given answers at the end of the unit .

17. The computer that provides resources to other computers on a network is known ___
18. The rules and data formats for exchanging information in a computer network are defined by _____.
19. The term Wide Area Network (WAN) usually refers to a network which covers a large _____ area.
20. LAN is a computer network that spans a relatively ___ area

2.7 COMPUTER VIRUS

A **computer virus** is a program that is able to copy itself when it is run. Very often, computer viruses are run as a part of other programs. Biological viruses also work that way, as they copy themselves as part of other organisms. This is how the computer virus got its name.

In addition to copying itself, a computer virus can also execute instructions that cause harm. For this reason, computer viruses affect security. They are part of malware.

Very often, the term is also used for other kinds of malware, such as trojan horses and worms. Even though this is wrong, it may be difficult to tell the difference between different kinds of malware; they often occur together, and only an expert may be able to tell them apart. Such programs also fit more than one category.

Computer viruses are created for a cause, sometimes they are created to spread political messages and they are also created to hack some system files.

Computer viruses are spread through many ways. Some of the types of spreading are: email, removable hardware, downloading and so on.

2.7.1 KINDS OF COMPUTER VIRUSES

There are different kinds of computer viruses:

- Probably the most common form is the *Macro-virus* or *script virus. Such viruses are programmed with the script function which is present in many text processing systems and spreadsheets; or with general "script" functionality of a program*
- *Boot sector viruses* infect the boot sector of floppy disks, hard drives and other media.
- *Executable files and scripts of the operating system*; including those that are run automatically when a medium is inserted into a drive
- *Cross-site scripting*: Scripts in web pages that replicate to other webpages.
- Any computer file; generally buffer overflows, format strings, and race conditions are exploitable.

Limited user rights can limit the spread of a virus

In the beginning, the operating systems used on Personal Computers did not have the concept of access control. There were no "users", everyone could do everything. More modern operating systems have the concept of access control. There can be more than one user, and there are "privileges". Certain users are only able to read certain files, and they may have no access to certain files. Other users are able to modify or delete certain files. These privileges can be specified for each file.

The damage a virus can cause is influenced by the rights it has; if the user has no rights to write to certain places in the system, the virus will not be able to spread. Another problem is that sometimes the system for rights management may be available, but that it is not used by default. This is the case with systems such as *Windows NT* or Windows XP, where by default all users have all rights.

2.7.2 ANTI-VIRUS SOFTWARE

Antivirus software can protect against known viruses. Some antivirus software scan files and compare a hash code for each file with its database of hash codes. If the code matches, it has likely found a virus. This way of doing things has some problems. It will only protect against viruses whose hash code (or "signature") is

known. The companies who wrote the antivirus need to keep the virus signatures up to date and need to give this information to the PC that is to be protected.

There are two possible modes of scanning: Either the file is scanned "on demand" (or "manually"), or it is scanned when the system registers an access to the file (commonly called "on access").

Antivirus software cannot offer full protection, even in the case the virus is known. Some viruses use something called polymorphic code to change their signature every time they move. No matter how many signatures the company has, they will not be able to stop these types of viruses.

Another way that antivirus software can protect against viruses is to use heuristics. Instead of knowing each virus by its signature, heuristic antivirus software looks at the behavior of software. If the software does something that seems bad, the antivirus software stops it. Since every step needs to be watched, this is a very slow way to do things.

"Live systems"

The best protection against viruses can be obtained by using a system that boots off a read-only medium, such as a CD, or DVD, and that does not allow write access to hard disk drives (or other removable media).

2.7.3 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with the given answers at the end of the unit .

21. What is a computer Virus?
22. What is an anti-Virus software?
23. What do you mean by “trojan horses” ?

2.8 SOFTWARE

Software represents the set of programs that govern the operation of a computer system and make the hardware run. The software is of two types. They are application software and system software.

2.8.1 SYSTEM SOFTWARE

Programme that manages supports the resources and operations of a computer system as it performs various information processing tasks. These programmes serve as a vital interface between system hardware and user's application programme**.**

Operating system

An operating system is a software component of a computer system that is responsible for the management of various activities of the computer and the sharing of computer resources. It hosts the several applications that run on a computer and handles the operations of computer hardware. Users and application programs access the services offered by the operating systems, by means of system calls and application programming interfaces. Users interact with operating systems through Command Line Interfaces (CLIs) or Graphical User Interfaces known as GUIs. In short, operating system enables user interaction with computer systems by acting as an interface between users or application programs and the computer hardware. Here is an overview of the different types of operating systems.

We know that there are two types of software: system software, application software. Operating system is system software. Let us first see why operating system is needed and then how it was developed in the last decades.

Consider a new born baby. The baby has a physical structure and life but no intelligence. As the body grows it learns the basic concept needed for life. The growth of the baby is in two dimensions.

1. Physical
2. Intellectual

Intellectual growth causes the baby to know how to live. A computer is similar to a baby. The physical structure of a computer is called Hardware. The software is the set of instructions given to the computers. But in order to understand the instruction the computer must have some basic knowledge. The basic knowledge is another software called the operating system. A computer program can be given to a computer only if it has the hardware and the operating system.

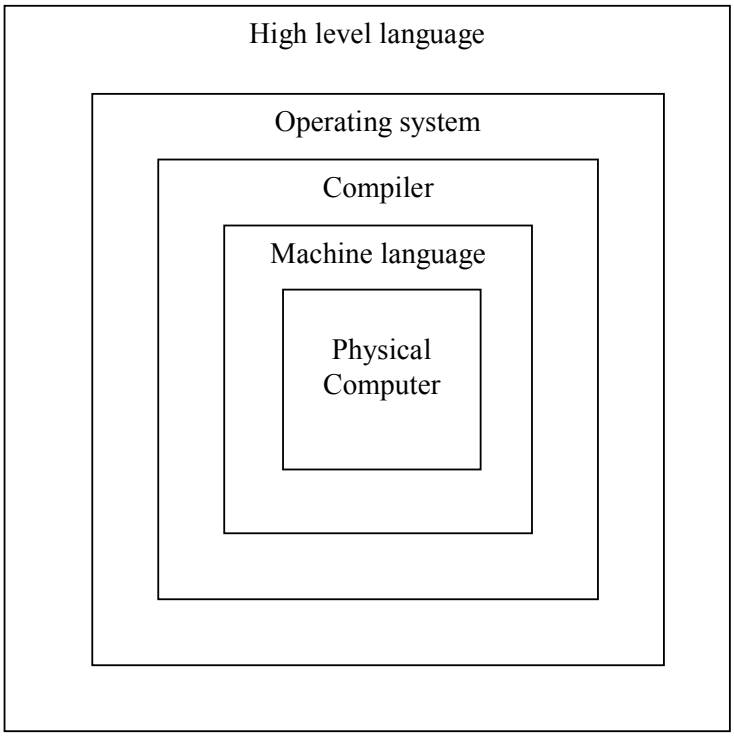
Whenever a computer is switched on, the operating system is first loaded. Only then we can operate the computer.

The need for an operating system

To solve a problem using a computer, we write program in a High level language. The computer executes the program in the following ways.

1. The computer is loaded into the main memory (compiler is a program which translates the high level language into the machine language).
2. The source program is loaded into the main memory (source program is the program written in high level language).
3. The compilation is carried out (the process of translating the source program into the machine language is called compilation. The program in machine language is called object program).
4. The errors in the program are pointed out.
5. Subroutines are linked to object program.
6. As the compiler's job is over, it may be taken out of the memory in order to give space for other operations.
7. The object program is now executed. If errors are detected during execution, they will be pointed out to the programmer for the sake of correction.

If the user gives commands for each of these operations one by one, then a lot of computer time will be wasted. So subroutines are written for each of these operations (A subroutines is a simple program). These subroutines form the operating system. The operating systems are intended to save computer time and facilitate the user. The following diagram shows the relationship between hardware and software.



2.8.2 OPERATING SYSTEM TYPES WITH EXAMPLES

As computers have progressed and developed so have the types of operating systems. Below is a basic list of the different types of operating systems and a few examples of operating systems that fall into each of the categories. Many computer operating systems will fall into more than one of the below categories.

GUI - Short for Graphical User Interface, a GUI Operating System contains graphics and icons and is commonly navigated by using a computer mouse. See the GUI definition for a complete definition. Below are some examples of GUI Operating Systems.

System 7.x

Windows 98

Windows CE

Multi-user - A multi-user operating system allows for multiple users to use the same computer at the same time and/or different times. See the multi-user definition for a complete definition for a complete definition. Below are some examples of multi-user operating systems.

Linux

Unix

Windows 2000

Multiprocessing - An operating system capable of supporting and utilizing more than one computer processor. Below are some examples of multiprocessing operating systems.

Linux

Unix

Windows 2000

Multitasking - An operating system that is capable of allowing multiple software processes to run at the same time. Below are some examples of multitasking operating systems.

Unix

Windows 2000

Multithreading - Operating systems that allow different parts of a software program to run concurrently. Operating systems that would fall into this category are:

Linux

Unix

Windows 2000

2.8.3. MS-DOS

MS-DOS (pronounced short for MicroSoft Disk Operating System) is an operating system for x86-based personal computers. It was the most commonly used member of the DOS family of operating systems, and was the main operating system for IBM PC compatible personal computers during the 1980s to the mid 1990s, until it was gradually superseded by operating systems offering a graphical user interface (GUI), in particular by various generations of the Microsoft Windows operating system.

2.8.4 WINDOWS

Windows is the operating system sold by the Seattle-based company Microsoft. Microsoft, originally christened "Traf-O-Data" in 1972, was renamed "Micro-soft" in November 1975, then "Microsoft" on November 26, 1976.

Microsoft entered the marketplace in August 1981 by releasing version 1.0 of the operating system Microsoft DOS (MS-DOS), a 16-bit command-line operating system.

The first version of Microsoft Windows (**Microsoft Windows 1.0**) came out in November 1985. It had a graphical user interface, inspired by the user interface of the Apple computers of the time. Windows 1.0 was not successful with the public, and Microsoft Windows 2.0, launched December 9, 1987, did not do much better.

The client version of Windows is a version that can be purchased and installed on personal computers (desktop computers, laptops and workstations) or purchased with these computers.

Name	Release date	Release version	Editions	Build
Windows 10	29 July 2015	NT 10.0[1]	• Windows 10 Home • Windows 10 Pro • Windows 10 Enterprise • Windows 10 Education	NT 10.0.10586.104

			• Windows 10 Mobile • Windows 10 Mobile Enterprise • Windows 10 IoT Core See Windows 10 editions	
Windows 8.1	17 October 2013	NT 6.3	• Windows 8.1 • Windows 8.1 Pro • Windows 8.1 Enterprise	NT 6.3.9600
Windows 8	26 October 2012	NT 6.2	• Windows 8 • Windows 8 Pro • Windows 8 Enterprise See Windows 8 editions	NT 6.2.9200
Windows 7	22 October 2009	NT 6.1	• Windows 7 Home Basic • Windows 7 Home Premium • Windows 7 Professional • Windows 7 Enterprise • Windows 7 Ultimate • Windows Thin PC See Windows 7 editions	NT 6.1.7600
Windows Vista	30 January 2007	NT 6.0	• Windows Vista Home Basic • Windows Vista Home Premium • Windows Vista Business • Windows Vista Enterprise • Windows Vista Ultimate See Windows Vista editions	NT 6.0.6001
Windows XP	25 April	NT 5.2	N/A	NT 5.2.3790

Professional x64	2005			
Windows XP	25 October 2001	NT 5.1	• Windows XP Starter • Windows XP Home • Windows XP Professional • Windows XP 64-bit Edition • Windows Fundamentals for Legacy PCs (8 July 2006) See Windows XP editions	NT 5.1.2600
Windows ME	14 September 2000	4.90	N/A	4.90.3000
Windows 2000	17 February 2000	NT 5.0	Professional	NT 5.0.2195
Windows 98	25 June 1998	4.10	• Windows 98 • Windows 98 Second Edition (23 April 1999)	4.1.2222 A
Windows NT 4.0	24 August 1996	NT 4.0	Windows NT 4.0 Workstation	NT 4.0.1381
Windows 95	24 August 1995	4.00	• Windows 95 • Windows 95 SP1 (31 December 1995) • Windows 95 OSR1 (14 February 1996) • Windows 95 OSR2 (24 August 1996) • Windows 95 USB Supplement to OSR2	4.00.950

			(27 August 1997) • Windows 95 OSR2.1 (27 August 1997) • Windows 95 OSR2.5 (26 November 1997)		
Windows NT 3.51	30 May 1995	NT 3.51	Windows NT 3.51 Workstation		NT 3.51.1057
Windows NT 3.5	21 September 1994	NT 3.50	Windows NT 3.5 Workstation		NT 3.5.807
Windows 3.2	22 November 1993	3.2	Simplified Chinese only		
Windows for Workgroups 3.11	November 1993	3.11	N/A		
Windows NT 3.1	27 July 1993	NT 3.10	Windows NT 3.1		NT 3.10.528
Windows 3.1	April 1992	3.10	• Windows 3.1 • Windows for Workgroups 3.1 (October 1992)		
Windows 3.0	22 May 1990	3.00	N/A		
Windows 2.11	13 March 1989	2.11	• Windows/286 • Windows/386		
Windows 2.10	27 May 1988	2.10	• Windows/286 • Windows/386		
Windows 2.03	9 December 1987	2.03	N/A		

Windows 1.04	April 1987	1.04	N/A
Windows 1.03	August 1986	1.03	N/A
Windows 1.02	May 1986	1.02	N/A
Windows 1.01	20 November 1985	1.01	N/A • MS-DOS

2.8.5 APPLICATION SOFTWARE

An application software is the set of programmes necessary to carry out operations for a specified application. Programmes directed towards the performance of particular application (or) use. Application programmes that direct computer to perform specific information processing activities for users. The programmes are called application packages, because they direct the processing required for a particular use or application.

2.8.6 COMPUTER SCIENCE LANGUAGES AND PACKAGES

1. HIGH LEVEL LANGUAGES

A task can be accomplished with the help of computer by representing the instructions to the computer in the form of a sequence of commands. Each and every commands are designating a specific function. There are different languages that provide several commands for writing the sequence of steps called program. According to the general usage of commands it can be split into languages and packages. In languages the commands are necessarily to be specified in a fixed structure with respect to the language. Each language is having unique defined structures. The commands cannot be used separately. This means that each commands can be executed separately.

BASIC

BASIC stands for Beginners All purpose Symbolic Instruction Code. It is similar to high level language, whose name is derived from the word BASIC. Since it is basic to the computer. It is a simple language and easy to learn. It allows easy modification of programmes; since the programme text is kept in main store during execution.

FORTRAN

FORTRAN means Formula Translation. It is a high level language. FORTRAN is a compiled structured language. The name indicates its roots in science and engineering. Still it is used heavily, although the language itself has been expanded and vastly improved.

COBOL

COBOL is an acronym of Common Business Oriented Language. COBOL programs are written mainly to process a volume ness amount of data involved in data processing task. It supports sequential, indexed sequential, random, random access file orgaisations. This language consists of identification, divisions and calculations. It is mainly used in business.

PASCAL

It was introduced by Nicholas in 1971. It is a very good language for non-numerical programming in which data not numbers but are strings of characters. It facilitates features to manipulate not only numbers but also vectors, matrixes, sets, lists, records, files etc.

C' Language

It is a high level language developed by Bell labs, which is able to manipulate the computer at a low level like assembly language. "C" can be compiled into machine language for almost all the computers. It is highly portable, machine independence-supports modular programming. It is a robust language. With the pointers feature helps to write system programs. It has rich data type and operator sets that help efficient programming.

C++ Language

It allows object oriented programming concepts. This means that the data and methods to access the data are put together and cannot be accessed by any other data or methods. The main concepts are Information hiding, Data abstraction and encapsulation, Inheritance, Poly morphism, Inline Function Call, Dynamic binding.

Visual C++

Microsoft application development system for the programming language is Visual C++. It is a GUI based OOPS tool. It helps writing program with efficient front end but following object oriented programming concepts.

Visual Basic

Visual Basic is developed by Microsoft Corporation in 1990. It is most popularly known Graphical User Interface tool for developing software. Visual Basic is an event driven programming language. This means that code is executed as a response to an event. Visual Basic provides a complete set of tools to simplify Rapid Application Development both for experienced professionals and for new windows programmers.

Power Builder

Power Builder is also the most popularly known Graphical User Interface tool for developing software.

Java

Java is an Object Oriented Programming based internet programming language. The main characteristics are called "architecture neutral", which enables Java program to on any system having minimum Java run environment. It has the features like Robustness, Security, Simplicity and extend ability. It has Java Data Base Connectivity.

C#

It is an advanced programming language of C++. It is a Dos based programming language. It does not support windows and Internet environment. So Microsoft, the producers of C# have decided to produce something, which can take care of this problem. So they have come out a programming language that enables programmers in quickly building solutions for the Microsoft.Net platform.

Visual J++

It is Microsoft's java visual programming environment. It can be used to create applet and application in Java language.

VB.Net

It is an advanced programming language of VB 6.0 launched by Microsoft. It is also called as Visual Basic 7.0. It is oriented with web browsers and their application programmes.

ASP

ASP stands for Active Server Pages. It is Microsoft's solution for building advanced web sites. Using ASP the user can, generate dynamic web pages which can display different content to different users or display different content at different times of the day.

VB Script

A subset of Visual Basic for applications of programming language, optimised for web related programming as with Java Script. VB script is the script code for VB scripting edition embedded with HTML documents or web pages.

Java Script

Java Script is a scripting language used to display alert messages, offer dropdown menus, open new windows, change images in response to mouse and key movements. Java Script allows us to create dynamic web pages.

Perl

Perl is an acronym of Practical Extraction and Report Language. It is a scripting language similar to C and UNIX. It is used for creating CGI software.

CGI Script

CGI means Common Gateway Interface. CGI Script is another scripting language. It is used for external application that has executed by a HTTP server machine in response to the request by a client, such as web browser. CGI is invoked when the user clicks the links in the web page.

HTML

HTML is the acronym of Hyper Text Markup Language. The markup language is used for documents of the World Wide Web. HTML is based on Standard Generalized Markup Languages (SGML). A tag language is used for representing document with hypertext links.

DHTML

DHTML is an acronym of Dynamic Hyper Text Markup Language. It is the extended version of HTML. DHTML is designed to add additional animated features and more user interactivity to the web pages. It involves scripts in Java Script and VB Scripts.

XML

XML is an acronym of Extensible Markup Language. It is more flexible than the HTML. Hyper Text Markup Language (HTML) is a great way to display data, but it's pretty lousy, when it comes to describe the data. The W3C recognized the need of new language to address this problem. The solution XML provides a standard for defining our own markup tags and data structure so that data can be easily exchanged online.

ASP.Net

It is the latest technology launched by Microsoft for authoring interactive and virtual website creations.

VML

Acronym for Vector Markup Language is VML. Its specification is mainly for editable 2D vector Graphics in an HTML or XML document.

VRML

VRML is the acronym of Virtual Reality Modeling Language for creating interactive three dimensional image sequences and possible user interactions with them. It is pronounced as "Vermal", is a language that specifies the parameters to create Virtual worlds networked together through the Internet and accessed through the web's hyperlinks. It was conceived in the spring of 1994 at the first annual WWW conference in Geneva, Switzerland. VRML file can be embedded in HTML documents but VRML enabled browser is needed for viewing such web pages. It works on the protocol blue tooth for wireless communications. It led us to future advancement.

2.8.7 COMPUTER SCIENCE PACKAGE

A set of components that perform related application functions is shortly called as package or packaged software. Packaged software is designed to meet the needs of a wide variety of users, not a single user or company. Packaged Software is also called as commercial off-the-shelf software because we can purchase these programmes off-the –shelf from software venders who sell computer products.

FoxPro

FoxPro is a data base management system which means that most of the functions are related to a database which holds the data to be processed. It is an earlier Xbased development system for Macintosh by Microsoft. It is generally used for developing application software and specifically business application softwares.

Visual FoxPro

It is packaged software prepared by Microsoft. It is also Xbase development systems for windows from Microsoft, Originally known as FoxPro for windows or FoxPro for Dos. Visual FoxPro added object orientation and client/server support.

Oracle

Oracle is the largest database and application development software in the world. The Oracle database was the first DBMS to incorporate the SQL language and to be ported a wide variety of platforms. The advancement of Oracle is Oracle 8i, Oracle 9i etc. Oracle supports all major networking communication protocols to link many data stores and network through the heterogeneous computing system prevalent in most organizations. It supports all major operating systems for both clients and servers.

Word Processing Package

The programmes that computerize the creation, editing and printing of documents such as letters, memos, reports and text data. Thus word processing package's application is office automation. The are MS-Word, WordStar and Page Maker.

Spread Sheet Package

Application programmes used for analysing, planning and modeling. They provide replacement for paper, worksheets, pencil and calculators. They are Lotus 1-2-3 and MS-Excel.

Telecommunication Package

These application packages can connect the computer with Internet. These packages help the user to explore in the World Wide Web. They are Internet Explorer and Netscape Navigator.

Graphics Package

It converts numeric data into graphical displays such as line charts, bar charts, pie charts and presentations. Presentation graphics can be produced by graphics packages such as Harvard graphics and Tell-A-Graph.

Multimedia Package

It helps the user to create multimedia oriented graphics, Multimedia sounds and their animations. They are Macromedia flash, Maya and Adobe premiere.

DTP Package

DTP stands for Desk Top Publishing. DTP package is a package of publishing works; that is text-oriented applications (or) word processing. The examples for DTP packages are WordStar, M.S. word etc.

3D Studio Max

It is a 3D modeling and animation programme. It was the first programme to bring professional animations in 3D animations. It is the software launched by kinetix.

Key Framer

It is an advanced animation package of kinematics. It gives more and more multimedia animations in 2D and 3D animations.

Premiere Pro

It is an animation package from Adobe. Through this animation package, we can produce more and more multimedia animations.

Maya

This is a multimedia package used to create animations and their effects in 3D and 2D. It is also good at producing animated graphics. It is software launched by Alias wave front.

Sound Forge

Sound Forge is a product of sonic software. It is mainly related with an audio/sound effect. It creates animated and digital sounds for multimedia. It is the application software, which produces the compressed good quality of sound.

Director

It is an application software for multimedia launched by macromedia. It provides more and more animations in 2D and 3D. Macromedia Director MX includes three-dimensional images, text and animations with the suite of macromedia design and development tools.

Flash

Flash is a graphics-editing tool. It has controls for adding and manipulating sound files. It can create movies with graphical animations. Flash is an animating tool used to create frames with animations.

Power Point

Power point is an effective software that offers tools and techniques for running and authoring dynamic presentations. It can be used to design slides, insert texts, add graphics and also animate the slides and objects there in. It can integrate documents and information created by other office and windows programmes.

Ervsoft 1st page 2000

It is a popularizing web editor or html editor from Ervsoft. It is a package of web authoring scripts in java and other scripts. 1st page 2000 is an extensive web-authoring suite that lets us to build and enchant web sites. 1st page contains HTML enchanting tools that bring our existing web documents to the next level. 1st page includes full support for SSI, CGI, Cold fusion, Asp and many other server side languages.

Microsoft Front page

It is a popular web-authoring programme from Microsoft for windows and Mac. It is the graphical editor for authoring the web pages. Front page explorer is the management tool that lets us to construct and maintain entire site.

We must have an ISP or web server to carry our web pages before other people. Just creating a web page does not automatically get into the web. We must engage and get instructions from an ISP regarding the procedure for transferring the files or web pages from our computer to the hosting web server.

Macromedia Dream Weaver

It is a popularizing web authoring software package from macromedia for windows and Mac. Flash designed for creating web page animations in web. It is fully customizable. One can create one's own objects, commands, modify menus, keyboard shortcuts, Java Script code to extend with new behaviours and property inspectors.

Visual InterDev

A window based development system from Microsoft for building dynamic web application using Microsoft standards. It is used to write ASP coding that can interact with database and active-x based components in the server. Microsoft Visual InterDev the web development system that provides all the tools for creating system that provides all the tools for creating dynamic internet and intranet web applications.

2.8.8 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with the given answers at the end of the unit .

24. A Programme that manages the resources and operations of a computer is _____

25. A software designed for creating web page animations in the web is _____

26. Windows 10 was introduced in the year_____

2.9 THE VARIOUS USES OF COMPUTERS

A computer is used in all human life. It has revolutionized all spheres of human activities. The most important areas have been given as follow.

1. **Routine Job Handling :** The routine classical and steno type jobs calculating and formality, bills, salaries, updating, stocks, tax return, reservations records and information are stored by the computer carefully.
2. **Traffic Control :** Controlling traffic, traffic lights. Television cameras are used to maintain traffic light routine.
3. **Electronic Money :** Automatic teller machine (ATM) is very common in banks. You can deposit and withdraw money with the help of ATM.
4. **Industrial Application :** It plays an important role in production controls. It bring efficiency in trade and industry.
5. **Trade :** In every trade computer is used successfully. It is used in Banks, Stock Exchanges, to control stocks and account.
6. **Scientific Research :** In every science research work become economical from time energy and from the money point of view. A large data is analyzed ever quickly and successfully.
7. **Medicine :** There is wide use in medical sciences e.g. ECG, CAT Scan, Ultra Sound, etc. the proper and accounts diagnosis is done with the help of computer. The medical apparatus are logically computerized.
8. **Space science :** The satellites are controlling the space with the help of computer. The information are collected and after analyzing, used to control the satellites. In this process the computer is playing a very important and vital role for the success of space research.
9. **Publication :** The composing work is speedily and economically with the help of computer. Computer also does the designing work. The quality is maintained in publication by computer.
10. **Communications** : The computer is used for sending message e.g. Tele-printer, fax, e-mail, internet etc. The import and export work is done on Internet.
11. **Education :** The computer is widely used in the field of education. An independent study field of computer science has developed which is very popular these days. At every stage computer education is compulsory. The distance education is using computer for instructional purpose as multi-media

approach. The computer makes a teacher-learning process effectively by involving audio and visual sense of learners.

2.9.1 USES OF COMPUTERS IN SCHOOLS

Two tsypes of applications of computer are popular in India. These are as : Administrative Applications of Computers.

I. Administrative uses

Many educational institutions computerize nearly all their operations from mailing labels to staff payroll. Computerizations of administrative functions are:

1. Office Applications

In the offices, computers are used in filing, typing/word processing, preparing mailing for dispatch and making labels of addresses.

2. Library Applications

In the library, computers are used for retrieval of bibliographic information, cataloguing, circulation, purchasing of books, journals etc., searching books and charging fines from students. Also databases can be prepared of the different users of library.

3. Financial Applications

Computers are used for making budgets, auditing, accounts receivable/payable, general ledger, purchase order generation, salary schedule analysis and maintenance of student's fees records etc.

4. Student Applications

Computers are used to make time table for students, report cards, grade information, maintenance of attendance, students' health and demographic records, result processing, fees statements, railway concessions cards, bio-data of students etc.

5. Personnel Applications

Computers are used to prepare payrolls of workers, maintenance of personnel records staff assignments, leave records of teachers, health records, tax information and reporting, issuing circular to teaching and non teaching staff, maintaining bio data of teachers and non teaching staff.

6. Research and Planning Applications

Computers are used in various research and planning applications such as test item analysis, project planning and evaluation, budget forecasting, feasibility of opening new courses etc. In well equipped modern educational institutions like IGNOU most of these functions are performed through computers.

II. Instructional Situations of Computer Application

i. Pre-testing of student's knowledge on enrolment.
ii. Planning and printing individualized programmes
iii. Monitoring students progress and
iv. Compiling test and scores etc. A number of such data files can be stored in the computer.
v. Robot –Based Learning

Robots have become a popular educational tool in some middle and high schools, as well as in numerous youth summer camps, raising interest in programming, artificial intelligence and robotics among students.

Elementary and High School Education

- **Robotics -** Robots can be used to bring students into the classroom that otherwise might not be able to attend. In New York, a second grader with severe, life-threatening allergies was unable to attend school due to his condition. A four-foot-tall robot provided a 'real school' experience for the boy, 'attending' school and bringing the boy with him via an internal video conferencing system. Robots such as the one mentioned are able to 'bring school' to students who cannot be present physically.

Special Education

- **Robotics** - Students with special requirements are reaching new levels of learning through the use of robotics in the classroom. With these technologies children with autism are learning communication and social skills and students with developmental issues and attention disorders are learning focus. Individuals with severe physical disabilities are also offered a constant companion and health monitoring system - all through the use of robotics. Robots can be programmed to suit each individual child's need, offering special education in a much simpler, accessible format.

Higher Education

- **Robotics -** Many careers require specialized knowledge in delicate practices, specifically in the realm of healthcare. When receiving a medical education, many students find benefits in the use of robotics. When learning to perform complicated medical procedures, a human subject isn't feasible, so educators are employing the use of robots as stand-ins. Robots can be created and programmed to give off all indications of human life, including breath and heartbeat. Their use can also be seen in such procedures as injections, surgeries and even delivering children.

2.9.2 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit .

27.The import and export work is done on ___

28.The computer makes a teacher-learning process effectively by using____.

2.10. LET US SUM UP

Computer hardware is the physical parts or components of a computer, such as the monitor, mouse, keyboard, computer data storage, **hard disk drive** (HDD), graphic cards, sound cards, memory (RAM), motherboard, and so on, all of which are physical objects that are tangible. Software, commonly known as programs, consists of all the electronic instructions that tell the hardware how to perform a task. These instructions come from a software developer in the form that will be accepted by the platform (operating system + CPU) that they are based on. **System software:** Helps run computer hardware and computer system itself. **Application software:** Allows users to accomplish one or more tasks. Software is generally created (written) in a high-level programming language, one that is (more or less) readable by people. **Computers in the classroom** include any digital technology used to enhance, supplement, or replace a traditional educational curriculum. As *computers* have become more accessible, inexpensive, and powerful, the demand for this technology has increased, leading to more frequent use of computer resources within classes, and a decrease in the student-to-computer ratio within schools. Students with special requirements are reaching new levels of learning through the use of robotics in the classroom.

2.11 UNIT-END ACTIVITIES

Answer the following

1. What are the differences between computer hardware and software?
2. Describe any two input devices of the computers?
3. Describe any two out-put devices of the computers?

4. Describe the generations of computers?
5. Describe the types of computers?
6. What are the differences between analog and digital computers?
7. What are the uses of system software?
8. Mention any five application software?
9. Describe high level programming languages?
10. What are the uses of computers in schools?
11. Describe the role of robot in special education?
12. Describe operating systems with examples?

2.12 ANSWERS TO CHECK YOUR PROGRESS

1. a programme
2. Hard Disk
3. Atrificial Intelligenc
4. Mega byte
5. in put devices
6. Charles Babbage
7. Herman hollerith
8. 2005
9. Tim berneu-Lee
10. 2009
11. 1954
12. Artificial Intelligence
13. Analog
14) Note-book Computer
15) Slimeline models
16) Personal Computer
17) Server
18) Protocol
19) a large Geographical area
20) Small
21) a program
22) Protects against the virus
23) Malware
24) System Software
25) Flash
26) 2015
27) Internet
28) Multimedia

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UNIT III MICRO TEACHING

Structure

3.1 INTRODUCTION

Microteaching is an excellent way to build up skills and confidence, to experience a range of lecturing/tutoring styles and to learn and practice giving constructive feedback. Microteaching gives instructors an opportunity to safely put themselves "under the microscope" of a small group audience, but also to observe and comment on other people's performances. As a tool for teacher preparation, microteaching trains teaching behaviors and skills in small group settings aided by video-recordings. In a protected environment of friends and colleagues, teachers can try out a short piece of what they usually do with their students, and receive a well-intended collegial feedback. A microteaching session is a chance to adopt new teaching and learning strategies and, through assuming the student role, to get an insight into students' needs and expectations. It is a good time to learn from others and enrich one's own repertoire of teaching methods. Microteaching is an organized method of practice teaching which involves a small group of preceptors/instructors who observe each other teach, provide feedback and discuss with one another the strengths of their presentations and potential areas for improvement. In this unit we are going to deal the meaning, definition of micro- teaching , micro- teaching cycle, skills and the components of micro- teaching ,episodes and Link Practice **.**

3.2 OBJECTIVES

After studying this unit, you will be able to

1. Understand the concept of Micro teaching, Cycle and the Components
2. Explain the steps in Micro teaching
3. Explain the Skills-Reinforcement, Stimulus Variation, Expaining, Probing questioning, Demonstration and Using of Black Board
4. Explain the need for Link Lesson

3.3 MICRO-TEACHING

Micro-teaching is one of the most important developments in the field of teaching practice. It is originated in Stanford University in 1963. The workers in the center for Research and Development in teaching evolved an approach to practical

teacher training. It is considered a mechanism of feedback device for the modification of teacher trainees.

3.3.1 ORIGIN AND DEVELOPMENT OF MICRO-TEACHING

The idea of micro-teaching originated for the first time at Stanford University in USA, when an Experimental Project on the identification of teaching skills was in progress under the guidance and supervision of the faculty members (Bush, Allen, McDonald Acheson and many others). This project was aided by Ford Foundation and Kettering Foundation. The team of experts was assigned the development of testing and evaluation tools to measure the attainment of teaching skills. At this juncture Keath Acheson, a research worker was investigating the utility of video tape recorder in the development of technical teaching skills. This instrument could be used for recording the class interaction and the behaviours of the trainee vividly and accurately. This lead to the development of a systematic and accurate method of giving feedback to the teacher trainee. All the steps of micro-teaching technique : Teach → Feedback → Replan → Reteach → Refeedback were formulated. Thus the name of micro-teaching was coined for this method of developing teaching skills in 1963. Since then this technique of teacher training has been widely used in almost all Colleges and Universities of Europe and Asia. In India, it is being used with great emphasis in all the teacher training programmes of developing teaching skills and competencies among teacher trainees. **Microteaching in India.**

- The department of Teacher education in the NCERT designed a project to study the effectiveness of Microteaching in 1975 in collaboration with the Centre of Advanced Study in Education (CASE) Baroda.
- Research and training programmes for teacher educators were also initiated in collaboration with the department of Education, University of Indore.
- Passi, Singh and Jangira developed instructional materials which were used to train teacher educators..

3.3.2 MEANING OF MICRO TEACHING

Micro-teaching is like a simulated social skill training to provide the feedback to teacher trainee for the modification of teacher-behaviour. It is a training device that can be applied at various pre-service an in-service stage in the professional development of teachers. Micro-teaching provides teachers with a practice setting or instruction in which the normal complexities of classroom are reduced and in which the teacher gets feedback on the performance.

Basically, micro-teaching is a 'Scaled down teaching encounter' in which a teacher teaches a small unit to a group of 5 to 10 students for a small period of 5 to 10 minutes and one teaching skill is practiced during the teaching. Micro-teaching is a new training design for pupil–teachers which provides an opportunity to practice one teaching skill at a time and with information about their performance immediately after completion of their lesson.

Micro-teaching is clinical teaching programme which is organized to explore the trainee to an organized curriculum of miniature teaching encounters, moving from the less complex to the more complex.

The basic principles of micro-teaching are simple. A public-teacher has a short lesson of about five minutes duration to small group of publics. At the end of the lesson the pupils leave and student-teacher discusses the lesson with his supervisor. After a short interval feedback from the supervisor and attempts to improve his previous lesson.

3.3.3 DEFINITIONS OF MICRO-TEACHING

Allen (1966) defines micro-teaching as a 'scaled down teaching encounter in class size and classtime'.

Chift and other (1976) have recently defined 'micro-teaching as a teacher training procedure which reduces the teaching situation to simpler and more controlled encounter by limiting the practice teaching to a specific skill and reducing teaching time and class size.'

Mc Aleese and Urwin (1970) suggest that the micro-teaching is most often applied to the use of closed circuit television (CCTV) to give immediate feedback of a trainee teachers performance in a simplified environment; but suggest that micro-teaching is best viewed as a form of simulated teaching usually incorporating reduced complexity and some feedback 'along a simulation spectrum ranging from the purely abstracts text-book of teaching practice through actual classroom teaching.'

Micro-teaching is defined as 'a teacher education technique which allows teachers to apply well defined teaching skills to a carefully prepared lesson in a planned series of five to ten minutes encounters with a small group of real classroom students, often with an opportunity to observe the performance on videotape' (Bush 1968).

Passi, B.K. (1976) says, "It is a training technique which requires pupil-teachers to teach a single concept using specified teaching skills to a small number of pupils in a short duration of time."

According to the Encyclopedia of Education (Ed. DeigHton), "Micro-Teaching is a real, constructed, scaled down teaching encounter which is used for teacher training, curriculum development and research."

Microteaching is a teacher training technique for learning teaching skills. It employs real teaching situation for developing skills and helps to get deeper knowledge regarding the art of teaching.

3.3.4 COMPARISONS BETWEEN MICROTEACHING AND TRADITIONAL TEACHING

MICRO- TEACHING	TRADITIONAL TEACHING
1. Objectives are specified in behavioural terms.	**1.** Objectives are general and not specified in behavioural terms.
2. Class consists of small group of 5-10 students.	**2.** Class consists of 40-60 students.
3. The teacher takes up one skill at a time.	**3.** The teacher practices several skills at a time.
4. Duration time for teaching is 5-10 minutes.	**4**. The duration is 40-50 minutes.
5. There is immediate feed-back.	**5**.Immediate feed-back is not available
6. Teaching is carried on under controlled situation.	**6**. There is no control over situation.
7. Teaching is relatively simple.	**7**. Teaching become complex.
8. The role of supervisor is specific and well defined to improve teaching.	**8**. The role of the supervisor is vague.
9. Patterns of class room interaction can be studied objectively.	**9**. Patterns of classroom interactions cannot be studied objectively.

3.3.5 ASSUMPTIONS OF MICROTEACHING

Micro-teaching is an idea, at the core of which lie five essential propositions:

1) Micro –teaching is a real teaching, but its focus is to develop certain teaching skill and not the development of pupils abilities.
2) Micro-teaching lessons reduce the complexities of normal classroom by scaled down class size, content and time.

3) Micro-teaching focuses on training for the development of specific teaching skills. One skill is practiced during course of teaching and brings in up to the mastery level.
4) Micro-teaching permits for the increased control of practice by providing the feedback to the pupil-teachers. A high degree of control can be imposed on the training programme.
5) Micro-teaching greatly expands the normal knowledge of results of feedback to teaching. It is highly individualized training programme.

3.3.6 PRINCIPLES UNDERLYING MICRO-TEACHING

Micro-Teaching is based on a few sound principles which are briefly explained below:

1. **Principle of One Skill at a Time:**

In Micro-Teaching, training of one skill is given till the person has acquired mastery over it. Then the second skill is taken up and so on. Thus, we find that Micro-Teaching is based on the principle of giving training of one skill at a time.

2. Principle of Limited Contents:

Micro-Teaching, limited contents are taken up and the teacher is required to use those contents only. It helps the beginner teacher teach that limited material easily and confidently.

3. Principle of Practice:

Micro-Teaching is based on the sound principle of practice. Here lot of practice is given by taking up on is skill at a time. Practice makes a man perfect. It helps the pupil- teacher in becoming better and better.

4. Principle of Experimentation:

A lot of Experimentation is involved in Micro-Teaching. The experiment consists of objective observation of actions perfumed under controlled conditions.

The pupil-teacher and the supervisor conduct experiment on teaching skills under controlled conditions. Variables like time duration of the lesson, contents of the lesson to be taught, number of students sitting in the class etc., can be easily controlled.

5. Principle of Immediate Feedback:

The micro lesson lasts for four or five minutes only. Thereafter, feedback is provided to the pupil-teacher. It helps the pupil-teacher to know his drawbacks and improve them effectively without any delay.

6. Principle of Evaluation:

In Micro-Teaching, there is continuous assessment of the performance of the pupil-teacher. Evaluation helps the learner know his drawback and then he is able to improve it.

In Micro-Teaching, each micro lesson is supervised by the supervisor or the peers. Drawbacks in teaching are pointed out and suggestion for improvement is given. Self-evaluation is also possible. Thus, evaluation ensures good learning by the pupil-teacher.

7. Principle of Continuity:

Learning of different skills of teaching is a continuous process in Micro-Teaching programme. The pupil-teacher is learning one skill at a time and learning continues till he has mastered the skill. For each skill, the principle of continuity is implied. It makes the teacher good and effective.

8. Principle of Individualised Training:

In Micro-Teaching, each trainee is given training very thoroughly. There is individual attention by the supervisor. The drawbacks in teaching are pointed out, suggestions given one by one and thus improvement is brought about.

3.3.7.CHARACTERISTICS OF MICROTEACHING

- Microteaching is a highly individualized training device
- Microteaching is an experiment in the field of teacher education which has been incorporated in the practice teaching schedule
- It is a student teaching skill training technique and not a teaching technique or method
- Microteaching is micro in the sense that it scale down the complexities of real teaching
- Practicing one skill at a time
- Reducing the class size to 5 – 10 pupil
- Reducing the duration of lesson to 5 – 10 minutes
- Limiting the content to a single concept
- immediate feedback helps in improving, fixing and motivating learning
- The student are providing immediate feedback in terms of peer group feedback, tape recorded/CCTV
- Microteaching advocates the choice and practice of one skill at a time

3.3.8 STEPS OF MICRO-TEACHING

The Micro-teaching programme involves the following steps:

Step I Particular skill to be practiced is explained to the teacher trainees in terms of the purpose and components of the skill with suitable examples.

Step II The teacher trainer gives the demonstration of the skill in Micro-teaching in simulated conditions to the teacher trainees.

Step III The teacher trainee plans a short lesson plan on the basis of the demonstrated skill for his/her practice.

Step IV The teacher trainee teaches the lesson to a small group of pupils. His lesson is supervised by the supervisor and peers.

Step V On the basis of the observation of a lesson, the supervisor gives feedback to the teacher trainee. The supervisor reinforces the instances of effective use of the skill and draws attention of the teacher trainee to the points where he could not do well.

Step VI In the light of the feed-back given by the supervisor, the teacher trainee replans the lesson plan in order to use the skill in more effective manner in the second trial.

Step VII The revised lesson is taught to another comparable group of pupils.

Step VIII The supervisor observes the re-teach lesson and gives re-feed back to the teacher trainee with convincing arguments and reasons.

Step IX The 'teach – re-teach' cycle may be repeated several times till adequate mastery level is achieved.

3.3.9 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

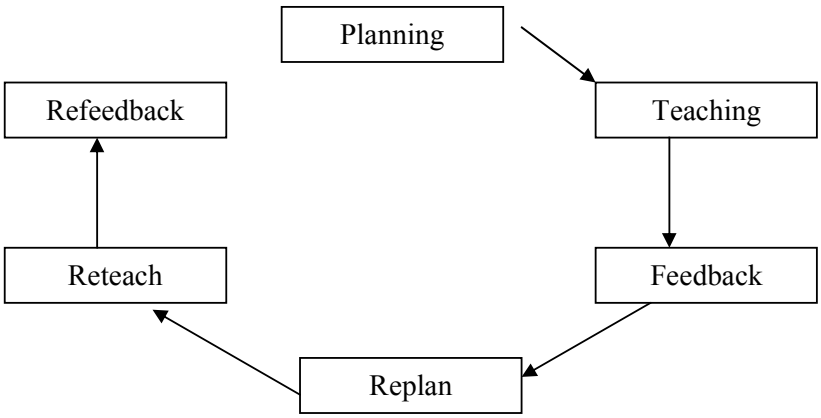
1. Which one of the following statements about "Microteaching" is **FALSE**
   a. It is an innovative method to teach students.
   b. The emphasis is on "how" to teach not "what" to teach .
   c. It requires peers and students to observe skills of the teacher.
   d. Specific areas of teaching skills can be assessed using this micro-technique .
2. Duration time for teaching in Micro-Teaching is __.
3. In Micro-Teaching ,Teaching is relatively ___
4. In Micro-Teaching ,The teacher concentrate ____ skill at a time

3.4.MICRO-TEACHING CYCLE

Teaching is considered to be made up of skills and each teaching skill is a set of related teaching behaviour which tends to facilitate Pupils' learning. Such skills can be defined, practiced, controlled, observed and evaluated. A particular lesson may involve any number of skills.

A teacher should be trained in all these skills for developing the ability to teaching. These skills are developed by Micro-Teaching.

The six steps generally involved in micro-teaching cycle are Plan, Teach, Feedback Replan, Reteach, Refeedback. There can be variations as per requirement of the objective of practice session. These steps are diagrammatically represented in the following figure :**Diagramatic representation of a Micro-teaching Cycle The following figure explains the above mentioned procedure in clear format**



Plan : This involves the selection of the topic and related content of such a nature in which the use of components of the skill under practice may be made easily and conveniently. The topic is analyzed into different activities of the teacher and the pupils. The activities are planned in such a logical sequence where maximum application of the components of a skill is possible.

Teach : This involves the attempts of the teacher trainee to use the components of the skill in suitable situations coming up in the process of teaching-learning as per his/her planning of activities. If the situation is different and not as visualized(in the planning of tTe activities, the teacher should modify his/her behaviour ás per the demand of the

situation in the Class. He should have the courage and confidence to handle the situation arising in the class effectively.

Feedback : This term refers to giving information to the teacher trainee about his performance. The information includes the points of strength as well as weakness relating to his/her performance. This helps the teacher trainee to improve upon his/her performance in the desired direction.

Re-plan : The teacher trainee re-plans his lesson incorporating the points of strength and removing the points not skillfully handled during teaching in the previous attempt either on the same topic or on another topic suiting to the teacher trainee for improvement.

Re-teach : This involves teaching to the same group of pupils if the topic is changed or to a different group of pupils if the topic is the same. This is done to remove boredom or monotony of the pupil. The teacher trainee teaches the class with renewed courage and confidence to perform better than the previous attempt.

Re-feedback : This is the most important component of Micro-teaching for behaviour modification of teacher trainee in the desired direction in each and every skill practice.

3.4.1 THE INDIAN MODEL OF MICRO-TEACHING

Micro-Teaching was introduced in India in 1967, with the humble attempt made by D.D. Tiwari of Government Central Pedagogical Institute, Allahabad.

In 1970, G.B. Shaw experimented with Micro-Teaching at M.S. University, Baroda. Then the Technical Teachers Training Institute, Madras introduced Micro-Teaching to train the technical teachers.

In 1947, Dr. N.L. Dosajh used Micro-Teaching as a teaching device in Teachers Training Institute, Chandigarh. He also wrote a book namely: Modification of Teacher Behaviour through Micro- Teaching'. NCERT, SCERT, in the different states have been propagation this concept.

The Indian model of micro-teaching developed by NCERT gives the following setting. - no. of pupils - 5-10- type of pupils - real pupils or preferably peers- type of supervisors - teacher educators or peers. - Time duration for micro-teaching lesson –6 minutes - Time duration for micro-teaching cycle – 36 minutes This duration is divided as :

Teaching – 6 minutes

Feedback - 6 minutes

Re-plan – 12 minutes

Re-teach – 6 minutes

Re-feedback –6 minutes

3.4.2 PHASES OF MICRO-TEACHING

There are three phases of the Micro-teaching procedure .

They are :

1. Knowledge Acquisition Phase.
2. Skill Acquisition Phase.
3. Transfer Phase of Micro-teaching.

1. Knowledge Acquisition Phase (Pre-Active Phase)

It includes the activities such as;

Ø Provide knowledge about teaching skills.

Ø Observe the demonstration of teaching skill.

Ø Analyze and discuss the demonstration of the teaching skill.

2. Skill Acquisition Phase (Inter-active Phase)

It includes the activities such as;

Ø Planning and preparation of micro lesson for a skill.

Ø Practicing the skill.

Ø Evaluation of the practiced skill (Feedback).

Ø Re-plan , Re-teach and re-feedback till the desired level of skill is achieved.

3. *Transfer Phase (Post –Active Phase)*

Ø Giving opportunity to use the mastered skill in normal class room teaching.

Ø Integrate the different skill practiced

3.4.3 MERITS OF MICROTEACHING

- It helps to develop and master important teaching skills.
- It helps to accomplish specific teacher competencies.
- It caters the need of individual differences in the teacher training.
- It is more effective in modifying teacher behaviour.
- It is an individualized training technique.
- It employs real teaching situation for developing skills.
- It reduces the complexity of teaching process as it is a scaled down teaching.
- It helps to get deeper knowledge regarding the art of teaching.

3.4.4 LIMITATIONS OF MICROTEACHING

It is skill oriented; Content not emphasized.

- A large number of trainees cannot be given the opportunity for re-teaching and re-planning.
- It is very time consuming technique.
- It requires special classroom setting.
- It covers only a few specific skills.
- It deviates from normal classroom teaching.
- It may raise administrative problem while arranging micro lessons

3.4.5 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

5. How many steps are involved in micro-teaching cycle?
6. How many phases of the Micro-teaching procedure?
7. In Which year Micro-Teaching was introduced in India?
8. Which organization has developed the Indian model of Micro-Teaching?

3.5 TEACHING SKILL AND ACTIVITIES

Teaching is considered science as well as on art. An effective teacher employs certain teaching skills to general calculative learning situations in his classroom. Micro teaching is a feedback device which is used for developing teaching scales.

'A teaching skill is defined as set of teacher behaviour and activities which are especially effective in bringing about desirable behavioural changes or skills among teachers and pupil teachers.

There are various teaching skills which have been identified by teacher-educators and educationists and can be developed among teacher-trainees.

Allen and Ryans (1969), have prepared and suggested a list of the following fourteen teaching skills.

1) Stimulus Variation
2) Set induction
3) Closure
4) Silence and non-verbal cues
5) Reinforcement of student participation
6) Asking question

7) Probing questions	8) Divergent question
9) Attending behaviour	10) Illustrating
11) Lecturing	12) Higher order questions
13) Planned repetition	14) Communication completeness.

B.K. Passi (1979) has described the following thirteen skills in his book 'Becoming Better Teacher'. A Micro-teaching approach.

1)Writing instructional objectives, (2) Introduction a lesson, (3) Fluency in questioning, (4) Probing questioning (5) Explaining, (6) Illustrating with examples, (7) Stimulus variation, (8) Silence and non-verbal cues, (9) Reinforcement student participation, (10) In-creasing pupils participation, (11) Using Black Board, (12) Achieving closure and (13) Recognising attending behaviour.

3.5.1 EVALUATION IN MICRO TEACHING

The teaching skills being developed through micro-teaching lessons are to be evaluated or observed by the peers or supervisors. The rating schedule is used as criterion measure. The most popular evaluative instrument for assessing the effectiveness of microteaching is the Stanford teacher *Competence Appraisal Guide* (S.T.A.G).

The problem of evaluation of micro-teaching effectiveness is much more difficult. The more important question is whether micro-teaching experiences lead to improve the teaching skills in a normal classroom teaching.

Allen and Ryan (1969) have given an evaluation sheet for assessing the skill of reinforcement. It consist of four dimension of the reinforcement skill.

1. The correct responses of the student are praised or rewarded by saying 'fine' 'good' excellent etc.
2. The teacher uses non-verbal cues (smile) to encourage his students.
3. The teacher gives credit to students answering a question partly correct.
4. The teacher refers to positive aspects of a student are previous responses.

These four dimensions are record by observer in terms of frequency that the teacher has used the category number of times. The categories are assessed on scale hanging from three to seven points. The S.T.A.G. consists of a number of scales rating the broad aspects of a teacher's performance.

The following are the few micro teaching skills with components and episodes

3.5.2 DESCIPTION OF THE SKILL OF REINFORCEMENT

Reinforcement increases the probability of the purpose occurring again. In a classroom situation teacher can use a variety of techniques to reinforce the students behaviour while positive reinforcement given at forced varying scheduled strong than the behaviour of the students. Negative reinforcement may skills the student's imitation.

The components involved in reinforcement are as follows.

1. Positive verbal reinforcement (PVR)

The teacher gives positive reinforcement through various verbal expressions. The teacher accepts the feelings of the pupil than he gets the students by saying "very good", "well done" "keep it up" etc.

2. Positive Non-Verbal Reinforcement (PNVR)

The teacher encourages the students by the means of his facial expressions movements of his hand and body. The teacher gives certain non verbal expressions like "holding his head", Giving hand shake" etc.

3. Negative Verbal Reinforcement (NVR)

The teacher decreases the changes of response occurring again by pointing out the mistakes of a person. Then the teacher should avoid discouraging expression worlds like "I don't like your behaviour", "No" "Wrong" etc.

4. Native Non-verbal reinforcement (NNVR)

This type of activity should be avoided namely in the class. This arise due to misbehavior of the students inside the class. The teacher neglects the students responses often "not encouraging by giving chance of answer" etc.

5. Writing pupils answer of the black board (W.P.A.B)

This is a very good method of active participation of the pupils in class. Giving him a chance to write answers on the black board often to get a live class. This should be encouraged.

Episode

Name of the trainee	:	xxxxxxxxxxxx
Skill	:	Skill of Reinforcement
Concept	:	Hardware
Tr	:	Good morning students
St	:	Good morning Sir
Tr	:	How many components are available in a computer?

St	:	Two components
Tr	:	Good Tell me the names (PVR)
St	:	Hardware and Software
Tr	:	Very good (The teacher claps his hand) come on the stage and write it on the board (PNVR) (WPAB)
St	:	Student writes on the board
Tr	:	Good, can anyone of you say what is a hardware? (P.V.R)
St	:	The physical components of the computer is called as hardware
Tr	:	Excellent (The teacher shake his hand) can you write an example for hardware (P.V.R) (P.N.V.R)
St	:	Mouse (W.P.A.B)
Tr	:	Good, you can go (The teachers pat the back of student) (P.V.R) (P.N.V.R)
Tr	:	(ask one boy) Do you give other example for hardware device?
St	:	Keyboard
Tr	:	Good, how do you say it is hardware device? (P.V.R)
St	:	Because, it is a physical compound
Tr	:	Very nice, are you clear? (P.V.R)
St	:	Yes, Sir,
Tr	:	Can any one say the use of the keyboard?
St	:	Keyboard is used to type the letters to the computer
Tr	:	Excellent come on the stage and write it on board. (P.V.R)
St	:	(The student writers on the board) (W.P.A.S)
Tr	:	Can you give exampled for keyboard
St	:	TVS keyboard
Tr	:	Excellent are you clear (P.V.R)
St	:	Yes Sir.

Tr	:	What is a program?
St	:	Coding is the program
Tr	:	This is not correct (Teacher asks the same question to another pupil) can you give me the correct answer (NVR) (NNVR)
St	:	Set of instructions is called a program

CODING FORM

Reinforcement

Interval (30 second each)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
PVR (Positive verbal reinforcers)												
PNVR (Positive Non Verbal reinforcers)												
NVR (Negative Non verbal reinforcers)												
NNVR (Negative Non verbal reinforcers)												
Writing pupil's answer on the black board												

3.5.3. DESCRIPTION OF THE SKILL OF EXPLAINING

1. Cognitive Link (CL)

It is a precious process of making connection between present concept to already known concepts. This can be done with the help of examples.

2. Illustrations (ILL)

The teacher may explain the concept by giving examples. He may use diagram, models, simplified problems etc.

3. Comparing and Contrasting (CC)

It is a process of discrimination the two similar concept of particular attitude.

4. Meaningful Repetition (MR)

The teacher will repeat the concept again and again. The repetition may be done by asking questions or more telling the formula. The purpose of repetition is to make the students to fix the idea in the mind.

Episode

Name of the trainee	:	x x x x x x x x
Skill	:	Skill of Explaining
Concept	:	Internet
Tr	:	Good morning students
St	:	Good morning Sir,
Tr	:	Yesterday, we had discussed about the network and characteristics of the network. Today we are going to study the topic internet (CL).
Tr	:	What do you see in this picture?
St	:	Connection of computers
Tr	:	Yes, the computers are connected to each other which is used to share the hardware and software resources from one place to another place. It is type of network called local area network. and network of networks is called internet. the internet is connected all or the world (ILL). The internet consists a LAN, WAN and MAM types a networks. In this the LAN is the smallest one and WAW is the biggest one. (ILL) (CC)
Tr	:	The requirements for connecting the internet are computer, modem Telephone line and an internet service provides. The internet service provides. The internet service provides the internet service for us like the couriers service (CL)
Tr	:	Any one can say what is the use of modem?
St	:	I don't know sir,
Tr	:	Modem is used to translate the analog signals to digital signals and digital signals to analog signals.
Tr	:	What is thus use of local area network?

St : It is used to share the hardware and software requirements

Tr : Good

CODING FORM

Explaining		**V.Poor**	**Poor**	**Average**	**Good**	**V.Good**
CL	(Cognitive Link)	0	1	2	3	4
ILL	(Use of illustrations)	0	1	2	3	4
CC	(comparing and contrasting)	0	1	2	3	4
MR	(meaningful repetition)	0	1	2	3	4

3.5.4. DESCRIPTION OF THE SKILL OF STIMULUS VARIATION

The skill of stimulus variation includes the behaviour namely teacher movement, teacher gesture, change in speech pattern, change in sensory focus, pupil talk and pupil movement.

1.Teacher Movement (T.M)

In order to secure and contain attention in the mind of the pupils. The teacher has to make very purposeful movement in the class.

2. Teacher Gesture (T.G)

The teacher has to use various gestures to draw the attention and to explain a subject in the classroom. The gestures are hand and body movements. By using these gestures the teacher can became more expressive and dynamic in his presentation in the class.

3. Change is speech pattern (CSP)

To express emotion or feelings the teacher can modulate voice with a sudden in tone and he can draw the attention of the students.

4. Change in sensory focus (CSF)

The teacher uses the models to create different situations and introduces the new words when the student does not listen the class. The teacher uses some sensory focuses and makes them listen.

5. Pupil Talk (PT)

The teacher makes the student to talk in the class with him by asking questions and holding discussion.

6. Pupil Movement (PM)

During the time of teaching the teacher can asks the students to write on the black board or ask them to open the windows and describes the things he saw.

EPISODE

Name of Trainee	:	xxxxxxxx
Skill	:	Stimulus variation
Concept	:	Internal Modem advantage disadvantage
Tr	:	Good morning students
St	:	Good morning Sir
Tr	:	How are you?
St	:	Fine Sir
Tr	:	What is your name?
St	:	My name in Raja (PT)
TT	:	Today is very hot, isn't if? (CSP)
St	:	Yes Sir (PT)
TT	:	What do you mean by modem (CSF)
St	:	Modem stands for Modulation and demodulation (PT)
Tr	:	Good (The teacher explains with gestures (T.G)
St	:	(The teacher on a student to draw the figure of Modem) (Function) (TM) (A student comes explains on concept on blackboard (PM)
Tr	:	Very good (TG) (patting)
St	:	Is it possible to have a modem within the CPU? (CSP)
Tr	:	Yes Sir (PT)
St	:	How is it possible? (He shows a picture of Internal Modern) (CSF)
Tr	:	But it is not worthy sir (PT)
TT	:	Why? (CSP)
St	:	It will get heat soon and the life time of a modem is very less if it is internal modem. (PT)

TT	:	Very Good (Patting) (TG). So these are the disadvantages of internal modem? Give some advantages (TM)
St	:	It is compact and it will not occupy more space. Moreover easy to handle (PT)
TT	:	Very good so today we have seen some of the advantages and disadvantages of internal modem (TG)

CODING FORM

Variation

Interval / **Variation**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Teacher movement												
Teacher Gesture												
Change in speech pattern												
Change in sensory focus												
Pupil talk												
Pupil movement												

3.5.5 DESCRIPTION OF THE SKILL OF QUESTIONING

Questioning skill is an important skill to be developed by any teacher. It is all the more important for a Computer Science teacher as questioning stimulates the thinking of the students and gets the concepts clarified and hence has significant contribution to teaching and learning Computer Science. Good questions can serve many purposes as given blow.

- Questions stimulate thinking.
- Questions channelise the thinking process
- Questions challenge the students
- Questions help in recalling and relating relevant concepts, facts and principles
- Questions ensure active student involvement in leaning
- Questions get the students' attention focused on the topic
- Questions arouse the curiosity of the students.

Components of the skill of Basic Questioning

- Structure
- Variety: - Low order, high order
- Pause
- Voice
- Reinforcement
- Fluency
- Distribution

Description of each component of the skill is presented in table

Skill Components	Description of Behaviour
Structure	• Grammatically correct. • Relevant – related to the topic being discussed. • Specific – calls for single and specific response. • Concise – does not contain redundant words.
Variety: Low Order	• Recall or recognition type of questions Examples: What is RAM? List the properties ……Define…….State the ……..
High Order	• Stimulate higher levels of thinking. • Require the use of higher intellectual skills • Example: how or why type
Pause	• Speed of asking. • Sufficient time for pupils to think and answer
Voice	• Audible to the entire class • Clear and loud voice
Reinforcement	• Encourage correct responses. • Discourage incorrect response
Distribution	• Even distribution of the questions to the entire class
Fluency	• Sufficient number of questions

3.5.6 DESCRIPTION OF THE OF PROBING QUESTIONING

- Probing is used when the students reply is correct but insufficient, because it lacks depth. Asking a number of questions about the response given to the first question. Such techniques that deal with pupil responses to your question are included in the skill of probing questioning.

  The five components of the skill of probing questioning are

1. Prompting technique

Prompting is a technique of probing or going deep into the pupil's initial response and leading him from no response to the expected response. This involves the teacher to give clues or hints to the pupil and ask leading questions.

2. Seeking further information

It consists of asking the pupil to supply the additional information to bring initial response to the criterion level or the expected level.

3. Refocussing

This technique consists of enabling the pupil to view his response in relation to other similar situations. It requires the pupil to relate a completely acceptable answer to other topics already studied by him.

4. Re direction technique

Redirection technique involves putting or directing the same question to several pupils for response. This is mostly used for the purpose of probing and for increasing pupil participation.

5. Increasing critical awareness technique

This technique mainly involves asking "how" and "why" of a completely correct or expected response. It is used to elicit a rationale for the answer.

CODING FORM

SKILL OF PROBING QUESTIONS

Interval / **PROBING QUESTIONS**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Prompting												
Seeking Further Information												
Refocussing												
Re direction												
Increasing Critical Awareness technique												

3.5.7 SKILL OF USING BLACKBOARD

Blackboard is the powerful teaching aid to teach from K.G to P.G. Blackboard, the visual aid is widely used in all sectors of education and training. The development of ICT is reducing the chalkboard work. A good blackboard work brings clearness in perception and it can be suitable used for displaying notes and diagrams during a lesson.

The components of the skill of use of blackboard are:

1. Legibility (L)
2. Size and alignment (S.A)
3. Highlighting main points (HMP)
4. Utilization of the space (US)
5. Correctness (C)
6. Position of the teacher (PT)
7. Eye contact with pupils (ECP)
8. Clearing of blackboard (CB)

1. Legibility (L)

The teacher should see that a clear distribution is ensured between every letter, adequate space is maintained between individual letters and words etc., to make handwritings more legible.

2. Size and alignment (SA)

In blackboard writing the size and alignment of the letters is very important. The letters should be uniform; the size of the capital letters should be as nearly vertical as possible without being diverged from a line.

3. Highlighting Main points (HMP)

The teacher should underline to highlight the main points or words on the blackboard. Colored chalks should be used suitably to draw the learners' attention on the main points.

4. Utilization of the space (US)

Overwriting on the letters should be avoided as it makes the blackboard work untidy. Only essential material should be retained on the blackboard.

5. Correctness (C)

The teacher should be careful about correct spelling, punctuation, grammar, etc., in constructing sentences on the blackboard. While writing on the blackboard inadequate knowledge of English grammar or mistakes done by the teacher reduces the attentiveness of the learners in the classroom.

6. Position of the teacher (PT)

At the time of writing, the teacher should stand on one side of the blackboard. With an angle of 45 degrees, so that the written work is visible to the learners on the blackboard.

7. Eye contact with pupils (ECP)

The teacher should maintain eye contact with his learners at the time of writing on the board. This maintains discipline and sustains the attention of the learners.

8. Clearing of blackboard (CB)

A teacher should clean the blackboard from top to bottom and not spread dust in the room. After completion of the lesson, the teacher should clean the entire blackboard before leaving the classroom.

Observation with Rating Scale

S. No	Components	Tallies	Poor	Below Average	Avg.	Above Average	Excellent
			0	1	2	3	4
1.	Legibility (L)						
2.	Utilization of the space and Alignment (USA)						
3.	Size and Alignment (SA)						
4.	Highlighting Main points (HMP)						
5.	Clearing of Blackboard (CB)						

3.5.8 SKILL OF DEMONSTRATION

Demonstration is an activity or process of teaching involving the showing of specimens or experiments or devices to explain and describe the concerned concept, idea, teaching point etc., in the teaching – learning process. That process makes the subject matter concrete with real life situation. The demonstration in teaching makes learning simpler and meaningful to the learner.

The components of demonstration skill are:

1. Appropriate topic, concepts, ideas, and teaching points (A)
2. Sequence order of presentation (SOP)
3. Adequacy of manipulative skill (AMS)
4. Creation of appropriate situation (CAS) and
5. Generalization (G)

Appropriate topic, concepts, ideas and teaching points (A)

The demonstration should be appropriate to the topic, concept, idea and teaching point. The appropriate specimens, experiments, or devices should be related to the topic, concept and teaching point in the demonstration to make teaching effective.

Sequence order of presentation (SOP)

The presentation material such as specimens or experiments or devices should be arranged in sequence order and presented in a systematic way. The sequential procedure in presentation of material indicates better preparation of the teaching learning activity.

Adequacy of manipulative skill (AMP)

In the demonstration of experimentation, the instruments or equipment should be repeatedly displayed in the teaching – learning process. Adequate manipulative or manual skills would certainly result in creating interest in the minds of the learners.

Creation of Appropriate Situation (CAS)

In the demonstration process appropriate physical situation with proper aids, instruments, diagrams, gestures, movements etc. should convey the idea appropriately. The demonstration arouses the curiosity of the learner.

Generalization (G)

Whenever the demonstration comes to an end, the teacher should conclude the theory and frame a rule or a principle. The teacher performs the demonstration to consolidate the learned points with the help of the learners.

3.5.9 LINK PRACTICE (INTEGRATION OF TEACHING SKILLS)

When mastery has been attained in various skills ,the teacher trainee is allowed to teach the skills together. This separate training programme to integrate various isolated skills is known as 'Link Practice'

ü It helps the trainee to transfer effectively all the skills learnt in the micro teaching sessions.

ü It helps to bridge the gap between training in isolated teaching skills and the real teaching situation faced by a student teacher.

ü Desirable Number of Pupils :15-20

ü Preferable Duration :20minutes.

ü Desirable Number of Skills :3-4 Skills

• Link practice or integration of skills can be done in two ways; ***Integration in parts*** 3 or 4 teaching skills are integrated and transferred them into a lesson of 15-20 minutes duration. And again 3 or 4 skills are integrated and are transferred all the skills to one lesson.***Integration as a whole*** Student teacher integrates all the individual teaching skills by taking them as a whole and transferred them into a real teaching situation.

3.5.10 NEED FOR LINK PRACTICE IN MICRO TEACHING

Link practice is a bridge between microteaching and full-class teaching where microteaching skills are effectively integrated and transferred.

There is a big contrast between microteaching and full class teaching. In microteaching, there is a scaled down process in terms of class room size, skills, scope of the lesson, time etc. Micro teaching is practiced under stimulated conditions. In macro teaching in addition to the existence of macro elements, there are also class room management problems. In link practice, the trainees are given chance of teaching real pupils.

There are many methods for link practice. One of the method is that after practicing three sub skills separately, the trainee may combine all the three sub skills in a lesson of 10 minutes. He then practices another three sub skills separately and links them. He then combines all the six sub skills in a single lesson of 15 minutes. And so on till the entire sub skills are combined in a macro lesson of 40 minutes and teaching a full class.

Link practice sessions are arranged with about 20 pupils for about the normal class period i.e. 20 minutes. The trainee prepares a series of eight short lessons on single unit and teaches each lesson for 20 minutes using appropriate skills particular to the content. The number of lessons used in link practice is flexible but selected topic should be adequately covered. The teaching skills namely ‘Set Induction’ and Closure can not be practiced in microteaching session in isolation. So, in link practice, the trainees include these skills also. At the end of each lesson, the trainee should get feed back about the lessons.

3.5.11 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

9. A book on 'Becoming Better Teacher'. A Micro-teaching approach was written by_____

10. Eye contact with pupils (ECP) is a component of the Skill of _____

11. Refocussing is a component of the Skill of _____

12. Cognitive Link is a component of the Skill of _____

13. Change in sensory focus is a component of the Skill of_____

14. The MICRO-Teaching Skills are effectively integrated in _____

15. Writing pupils answer of the black board is a component of the Skill of_____

3.6 LET US SUM UP

Microteaching is a scaled-down, simulated teaching encounter designed for the training of both preservice or in-service teachers. Its purpose is to provide teachers with the opportunity for the safe practice of an enlarged cluster of teaching skills while learning how to develop simple, single-concept lessons in any teaching subject. Microteaching helps teachers improve both content and methods of teaching and develop specific teaching skills such as questioning, the use of examples and simple artifacts to make lessons more interesting, effective reinforcement techniques, and introducing and closing lessons effectively. Immediate, focused feedback and encouragement, combined with the opportunity to practice the suggested improvements in the same training session, are the foundations of the microteaching protocol.

3.7 UNIT- END ACTIVITIES

1. What are the differences between Traditional and Micro-Teaching?
2. What are the Characteristics of Micro-Teaching?
3. Describe the Micro-Teaching Cycle?
4. Describe the steps for Micro-Teaching?
5. Explain the skill of Stimulus Variation?
6. What is the need of Link Practice in Micro-Teaching?
7. Write down the episode for the skill of Probing Questioning

3.8 ANSWERS TO CHECK YOUR PROGRESS

1.a	9.Dr.Passi
2.5-10 minutes	10.use of Black Board
3.Simple	11.Probing Questioning
4.One	12.Explaining
5.Six	13.Stimulus Variation
6Three	14.Link Practice
7.1967	15.Reinforcement
8.NCERT	

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UNIT IV INSTRUCTIONAL METHODS

Structure

4.1 INTRODUCTION

Computer programming is part and parcel of the computer science education. It is an essential skill that must be mastered by anyone interested in studying computer science. Normally, in teaching computer programming, students will first be introduced to the concept of programming and data structure where they are taught on how to analyze problems, use specific techniques to represent the problem solution and validate the solution. Next the learners are required to convert the problem solution into a program using a specific programming language. They are then required to test their program to verify for syntactical or logical errors to ensure that the output is correct according to the problem requirement. Maintenance is the last process in implementation phase and it is based on user requirement needs. Maintenance is required when there are changes in user requirements or important components. In this unit we are discussing Year Plan, Unit plan, Lesson Plan, writing instructional objectives , planning for specific behavioural changes, Methods and approaches of teaching Computer Science and Computer Assisted Instruction (CAI).

4.2 OBJECTIVES

On completion of this unit , you must be able to

1. Understand the Steps for Year Plan
2. Write down Unit Plan
3. Understand the need for writing lesson plans.
4. Write down the objectives for a given lesson.
5. Develop the skill in writing Lesson Plan
6. Understand the methods of teaching Computer Science
7. Use different approaches for teaching Computer Science
8. Understand the principles of Individualised Instruction
9. Write down the Programmed Learning Materials in Computer Science
10. Prepare the CAI package in Computer Science

4.3. YEAR PLAN

A course of study can be divided into units. A unit is defined as the series of related learning experiences built around one central topic. A unit develops a generalization through the learning of related facts, concepts and views (or) view points. Therefore a unit is a large segment of subject matter having a common theme / idea.

Lesson plan should give clear indication what students are going to do for learning and what they are expected to grasp in the class room during the process of teaching.

Planning begins with the goals of teaching-learning situation, carried through planned means of achieving these goals and ends with plans for evaluating the efforts of all persons involved.

So plans should be made in terms of goals to be achieved. Therefore, the stages in planning should be

1. Course planning which could determine the general objectives, specific objectives, and accordingly select the course to be taught.
2. Organization of the selected material into meaningful segments of activity and experience.
3. Plan the daily work around a device known as 'Lesson Plan' In this lesson you are exposed to the various components of a lesson plan in Computer Science.

An annual plan or Year plan is intended to provide teachers and school administrators with an overview of curriculum guidelines at a glance, and therefore, it can definitely help educators to stay on track each month, for instance in meeting the curriculum goals that have been set up for the school year. Year planning is done by a teacher at the beginning of the year for the entire course.

Designing Annual Teaching Plan

The following are only suggestions to the layout of your annual plan, and therefore, you may feel free to adapt, modify or even improve any format resulting from them to fit your specific needs and the needs of your group(s) of learners.

Section One

Start by labeling your plan, and providing general information about the subject you are designing the plan for, school's name, school year, and target group (s) you will be teaching in the first section.

1. General Information Area: C- Programming :Class Higher Secondary ……. School Year: 2015 -2016 Target group (s): XI Standard

Section Two

Take your Curriculum Guidelines to look at the objectives per school year that have been proposed for each component of the Programming competence in C.

2. Objectives

On successful completion of this course the students should be able to

i. Understand the basics of C language
ii. Use conditional statements and loops
iii. Write programmes using of arrays
iv. Uses functions for writing programmes
v. Uses pointers for writing programmes
vi. Use the skill of file processing

Section Three

3 Model Annual Plan

Insert a blank table for your template in a word processing document and list the months that correspond the present school year (i.e June to April) in the first column

Month / weeks	**I**	**II**	**II**	**IV**
June				
July				
August				
September				
October				
November				
December				
January				
February				
March				
April				

Section Four

4. Methodological Strategies

Read the Curriculum specifications you have been provided with and summarize information on the methodological strategies as well as the genres and

text types that have been proposed as tools for developing each programming skill with your corresponding groups of learners.

Unquestionably, you may feel free to propose and write down any other methodological strategy (ie) you consider pertinent by keeping in mind they should reflect the basic principles Computer Programming:

- make real procedure of programming.
- provide opportunities for learners to experiment and try out what they know.
- be tolerant of learners' errors as they indicate that the learner is building up his or her Programming Competence .
- provide opportunities for learners to develop both accuracy and fluency.
- Link the different skills such as analyzing problem, preparing flow chart, writing algorithms, writing Programmes, debugging the programmes and executing the programmes together, since they usually occur so in the real Sitiuation.
- let students induce or discover Programming rules.

Section Five

5. Resources and Equipments

Briefly list the didactic resources (i.e. official textbook/s as well as supplementary materials and equipment) that are available at your institution or you have made or provided and which you consider are appropriate to facilitate the students' learning process.

Section Six

6. Evaluation

Take the Curriculum Guidelines document and carefully look at the assessment indicators per skill for your target group. Then describe briefly the type of evaluation you will carry out with your students (i.e. diagnostic, formative, and/ or summative) according to State regulations and when it will be done (at the beginning, middle or end of the first/second term, school year, etc.), as well as the type of assessment you will carry out (i.e. formal/ informal) and the type of assessment activities and / or instruments you will use (e.g. quizzes, presentations, writing Programmes etc.)

Characteristics of Year Plan

- ❖ The number of units to be covered as per the syllabus during the academic year.
- ❖ The number of periods needed to cover each unit, the number of periods allotted for Computer Science per week.
- ❖ The number of working days per term and for the year.
- ❖ The number of days allotted for project work, revision tests & examinations.
- ❖ The number of holidays during the academic year.

Advantages of Year Plan

- ❖ Year planning helps the teacher in planning for the entire course for the whole of the academic year.
- ❖ It keeps the teacher on the right track.
- ❖ It enables the teacher to cover the syllabus within the allotted time planning saves waste of time and energy.
- ❖ It helps the teacher in orderly and systematic teaching.
- ❖ It gives a lot of self-confidence to the teacher as she is sure of what is expected of her during each period / week / month / term etc.
- ❖ It will help to carry out all the curricular and Co-curricular activities in time without haste and anxiety.

It helps in allotting time for lab, projects, revision, tests and examinations etc

4.3.1 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

1. Year planning is done by a teacher at the _____of the year for the entire course.
2. _____keeps the teacher on the right track.
3. _____helps the teacher in planning for the entire course for the whole of the academic year.
4. Self-confidence is achieve by the teachers by using _____

4.4 UNIT PLAN

Unit: (Preston) He defines a unit as "a large block of related subject matter as can be over-viewed by a learner".

A course of study can be divided into units. A unit is defined as the series of related learning experiences built around one central topic. A unit develops a generalization through the learning of related facts, concepts and views (or) view points. Therefore a unit is a large segment of subject matter having a common theme / idea.

Unit Planning: Unit planning is a part of year planning and it is a middle ground between course / year planning and lesson planning. It is longer than lesson plan, but shorter than course planning.

There are two types of units

1. Resource Units 2. Teaching Units

The Resource unit is intended to be a general guide in assisting the teacher to enrich the teaching unit. It is more comprehensive, than the teaching unit. It is according to the level of the knowledge of the teacher. It requires pedagogical skill for presenting. Resource units are developed by the curricular experts and classroom teachers.

The teaching unit is important and useful to the prospective or In-service teachers.

A unit plan is basically a list or series of lesson plans designed around a specific topic, project, content, etc, and among other reasons that apply for planning in general, it is important for teachers to design one because a great deal of learning is directly correlated to teachers' planning and preparation.

Designing a Unit Plan

Unit plans are consistent with State curriculum guidelines. Therefore, you should be aware of the standards as well as the contents for the subject matter you intend to write about in a unit.

- You must stick to a timeline to complete a unit.
- You should take some time to review what resources are already available to you (for designing your Unit Plans you may unquestionably resort to your Curriculum Specifications and the textbooks you receive).
- You should know about your students' needs and interests (through a diagnosis and/or survey) as well as have pedagogical resources available before you begin planning the lessons you choose.
- Once you review what resources you can resort to, you should create a diversity of assessment tools to evaluate learning because you should ensure students meet the objectives through both formative and summative evaluation.
- After considering your students' needs and the timeline, select what may fit their learning styles and use lessons and activities that motivate their curiosity and interest.
- You can follow a standard Procedure to prepare a unit.

The Procedure may begin with the objectives but also include the competences addressed, materials, lessons, assessment, resources, etc.

Components in a Unit Plan

1. **Unit Title & Subject Area**: The theme of your unit and subject you are teaching.

2**. Communicative competence components**: Briefly list the ones covered in this unit plan.

3. C**lassroom/ Level**: The classroom in which the subject is taught and the level according to the Curriculum Guidelines.

4**. Unit Rationale**: Your rationale is your overall justification for the unit, and basically .what you will have to do is to provide a paragraph explanation to describe the value of the unit that is presented, the why the unit is important, how it will benefit students and where it will fit in the curriculum. This is prepared by individual teachers based on the students, school, community, and on curricular and instructional objectives and needs.

5. **Goals:** They are also called long-term objectives and describe the purposes or major concepts that will be taught. It is expected that from each goal, several specific objectives could be pulled out. The goals will cover the entire unit whether it is 3 lessons or 8.

6. **Objectives**: These come from the goals and represent the content areas or skills that would be included on all of the lesson plans for the unit. They are more specific than the goals. Objectives must be measurable. (Short-term or immediate objectives).

7. **Content**: Identify and organize the topics that are included in the unit.

8. **Learning activities**: The main methods/activities for teaching each goal. While not as detailed as the instructional procedures in a lesson plan, they should contain all key information. Example: display a power point presentation, introduce the Syntax for writing a programme.

9**. List of Sources**: All sources consulted in preparation of the unit should be listed. Remember multiple sources are expected.

10**. List of Materials**: List all materials needed to teach the unit that are not readily available to the teacher every day.

11. **Assessme**nt: Identify the ways students' learning will be measured as well as how students will receive feedback and list the strategies and instruments you will use. (remember the way you measure students' learning will depend on what you want them to learn—i.e. objectives—and the learning activities involved)

12. **Explanation of how the unit plan addresses a particular student profile.**

Demonstrate how your plan addresses the interests and needs of your students (you may resort to the results you got from the administration of diagnostic tests at the beginning of the school year because that may have provided you with some information on your learners' strengths and weaknesses). The example for unit planning is given below.

Topic: Fundamentals of Internet Computing

Objectives : Objectives must be written clearly explained. For an example, If we are going to teach the unit **Fundamentals of Internet Computing**, we can consider objectives as follows.

On successful completion of this unit students should be able to:

1. Understand the fundamental principles of computer systems and the Internet;
2. Design web sites;
3. Use simple client-side programming;
4. Understand the principles of user interface design and human-computer interfaces.

Learning Experiences: This module provides an introduction to the key concepts of Internet computing. Starting with the fundamentals of computer systems and the Internet, students progress to learn how to design web sites and how to utilize simple client-side programming. Issues related to user interface design and human-computer interfacing (HCI) are covered. Broader issues related to the use of the Internet for Blogging and Social Networks are discussed. The practical element of the module allows students to develop skills necessary for web site design using simple client side programming.

Method & Materials

1. Method: Inductive, deductive, analytic, synthetic, Problem solving etc

2. Techniques: Drilling, Questioning, assignments

3. Materials: CAI, Chart, Model, Chart, Real Objects.

Evaluation

Formal Written Examination; Continuous Assessment

Feedback

The following can be given – Effective Computer Package

- Reteach
- Drilling
- Remedial teaching

Advantages of Unit Plan

- ❖ An unit plan should breakup a lengthy unit into smaller sub units so that pupils can easily grasp the ideas.
- ❖ Without losing the continuity, a teacher can present a lesson, principles and follow a systematic teaching.
- ❖ It helps the teacher to plan a variety of learning experiences keeping in mind the individual differences, the nature of content and objectives to be achieved.
- ❖ The pupil can see various facts, principles and can able to relate them with the unit.
- ❖ Unit planning has a proper provision for the diagnosis of the learning difficulties of the students and subsequent remedial instruction.
- ❖ Unit planning paves the way for a proper and appropriate daily lesson planning.

4.4.1 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

5. The series of related learning experiences built around one central topic is called a _____

6. Unit plans are consistent with the guidelines of _____

7. A course of study can be divided into _____

8. The middle of year and lesson planning is _____

4.5 PREPARATION OF A LESSON PLAN

In education it is necessary to plan a lesson scientifically. In the teaching of Computer Science ,writing a lesson plan is very important. It creates self-confidence in the teacher. It saves a lot of time through careful organization. In a lesson plan, the general instructional objectives and the specific instruction objectives must be started clearly. These GIOs and SIOs determine the learning experiences to be provided.The main steps in any lesson plan are a. motivation,b. presentation, c.application, d.review and e. home assignment.

A lesson plan is an instructional outline prepared by the teacher in order to impart systematic and planned information to the students in the class

It is obvious that a plan is needed for teaching. If a lesson plan is prepared based on the instructional objectives it is known as an objective-based lesson plan. Teaching consists of two parts viz., (a) Science part and (b) Art part. Science part of teaching consists of preparation of lesson plan, preparation of instructional software materials etc. Art part of teaching involves the execution of the lesson plan i.e. teaching the lesson by following the lesson plan prepared and utilizing the software appropriately. Therefore, both the parts of teaching need intensive practice and training.

4.5.1 IMPORTANCE OF LESSON-PLAN

For constructing a lesson-plan, following elements are important—

1. Teacher should have capacity to write teacher-objective in a general or behavioural form.
2. Teacher should have controlling distribution and content.
3. Teacher should have complete knowledge about use of teaching- methods

and teaching material and he also should know that how these can be used effectively.

4. Teacher should have capacity to co-ordinate between teaching processes in access models.
5. Teacher should also know how to construct circumstances of inspection and evolutionary questions.
6. Teacher should know general comprehension of model of lesson plan.

4.5.2 LESSON PLAN WRITING IN COMPUTER SCIENCE

Objective-based lesson planning, which we are going to follow, consists of four columns viz. specifications, content, learning experience, and evaluation. A single lesson plan does not mean a single lesson. Even for a single lesson one can write many lesson plans. Therefore, a lesson plan denotes a plan for a single teaching unit. So, before writing a lesson plan one should choose the topic first and should segment the subject matter on the basis of the instructional objectives viz., knowledge, understanding, application and skill.

Then every segment of the subject matter should be stated in behavioural terms and every then and how the behavioural terms have to be measured by using appropriate evaluation techniques. While writing a lesson plan one should try to maintain the horizontal relationship among the four-column viz., . specification column, content column, learning experience column and evaluation column. The lesson plan, which you are going to prepare, should be flexible and should be natural. It is only a tentative plan before teaching a lesson.

A sample objective based lesson plan for teaching a unit lesson in computer science is given below for better understanding.

4.5.3 HERBARTIAN LESSON-PLAN

It is an ancient method of lesson-plan. This method is used from past time but today its use is also not less. In mostly training institutions Herbartian lesson-plan is used. This lesson-plan is centralized on content. It is a gift of classical human organization theory. In this presentation is forced. Instead of interests, attitudes, values and relations of student, teaching of memory level is important. In this rote fiction is emphasized. Herbartian lesson-plan can be easily used in teaching of any subject.

Theoretical Foundation

Foundation of **Herbartian** lesson-plan is apperceptive mass theory. The concept of this theory is that knowledge is taken from outside and it is stored. By teaching, which relates new knowledge with previous knowledge learning becomes effective and permanent.

Herbartian five-step process's different steps are described below-

1. **Preparation**—Teacher collects elements of content in his mind and arranges them in a sequence.
2. **Presentation**—Teacher presents new knowledge by relating it with previous knowledge of students. He does this presentation with the help of" developmentory and comprehensive questions.
3. **Comparison and Abstraction**—Teacher establishes relationship between new facts and previous facts.
4. **Generalization**—Teacher tries to tell elements used in more than one facts so that he can conclude an act.
5. **Application**—Teacher represents such conditions, in which student can use his learnt knowledge.

4.5.4 OUTLINE OF LESSON-PLAN

On the basis of these five steps, outline of lesson-plan is developed. Main points of this are as following:

1. Subject, topic, class, section, time period and date.
2. General objective.
3. Specific objective.
4. Introduction
5. Objective statement.
6. Elucidation.
7. Development Question.
8. Black-board summary.
9. Recapitulation question.
10. Home-work.

In Herbartian lesson-plan, these points are followed. Description of these points are as follows—

1. Subject, Class and Topic etc.—It is limitation and specification of lesson-plan. First of all topic is chosen. On which level teaching should highly done; date of teaching, class and section etc., are decided early. In which school, teaching will be done, is also described.

2. **General Objectives**—General objectives are determined on the basis of first points. General objectives of language, science, mathematics ,Computer Science and social subjects are different. By use one topic for different levels of a subject its general objectives are different. Lesson-plan helps in achievement of general objectives, but by teaching of a time period only specific goals can be achieved.

3. **Specific Objectives**—With the help of a lesson-plan, specific objectives related to general objectives can be achieved, social subjects gets facts and information by lesson-plan. By teaching, language skill gets developed. By science, Computer Science and mathematics, efforts are consulted and reason-effort develops the understanding capacity. In this way on, the basis of topic of subject, specific objectives are determined.

4. **Introduction**—How will teacher teach his lesson its introduction is being ready. In introduction teacher brings students on new topic with the help of questions based on pre-knowledge. In this much intelligence is needed. In starting of lesson, help is taken by introductory questions.

5. **Objective Statement**—Teacher takes out topic from students with the help of introductory questions and gives statement of topic that we shall discuss this topic today.

6. **Developmentory Question— after objective** statement when teacher starts lesson, then to represent the subject he asks questions, which are called development questions. Such questions are important for logical development of lesson.

7. Elucidation— when student did not give clear answer of development questions, then teacher gives his statement for elucidation of that.

8. Black-Board Summary—Teacher writes teaching points and their arrangement on black-board. In maths, science, language teaching, teacher also writes hand to hand and in social subjects black-board summary is given at the end

9. **Recapitulation Questions**—Students also copies black-board summary on their note-books. After it black-board summary is rubbed by teacher. To revise topic and exercise, he ask questions. With the help of these questions, knowledge becomes solid and in a well arranged form is given to opinions. With these question, it is known that

how much students I have learnt.

10. **Home-Work**—Teacher also gives home-work to student on the basis lof topic.

Its aim is also to exercise and revise, by home-work students also gets opportunity to assimilate.

4.5.5 WRITING INSTRUCTIONAL OBJECTIVES

When a child borns, then there is no zoologically difference between him and an animal but rapidly according to social validities he converts in social personality. Really only social behaviour is a difference between an animal and human.

This social behaviour makes a human superior than an animal. Behaviour of animal human, activities by inmate dispositions, whenever of social human activates according of social validities.

Society consigned liability of this behaviour modification to schools. Even this behaviour modification is teaching, which is done by internal communication between teacher and student in schools.

Before studying about objectives of teaching computer science, we should know, what difference between aims and objects is. Generally student think that aim and objects have same meaning.

To declare the difference between these both objectives of teaching computer science can be divided in following two parts.

1. General objectives or aims
2. Specific objectives

General objectives or Aims

In general language, general objectives are also called aims or goals, goals are ideal. Its area is infinite, generally it is impossible to achieve it in full form. For achievement of goal whole school, society and nation is responsible.

Anerudite said, "Aims or Goals are broad general statements, some lines vague in meaning, which generally shape the character of educational programme".

For example, student should use scientific view point to solve daily life problems; development of logical capacity of student; to make changes in education.

Causes of Formulation of Goals

Formulation of goals is done for following reasons-

(i) To establish an over all environment of the class-room and

(ii) To help the teacher as a guide for writing special behavioural objectives in his class-room.

Specific objectives

Specific objectives are determined for different subjects and sub-subjects. These objectives are used not only for teaching, but also for checking of student's acquisition.

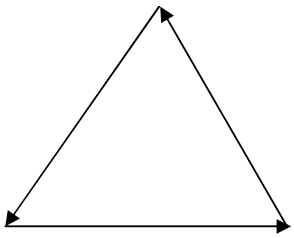
Specific objective is a complete statement divided in two parts. Its first part is related with desired behavioural change of students and second part is related with contents, by which the change in behaviour of student is to occur. First part and second part sequentially can be called modification part and content part. Specific objectives have a finite area and these can be achieved in full form.

4.5.6 CONCEPT OF TEACHING

By behavioural analysation, whole process of teaching can be displayed in form of a Tripolar Process.

Goal

Educational Objectives (EO)



Means Evidences

Learning Experience (LE) Change of Behaviour (CB)

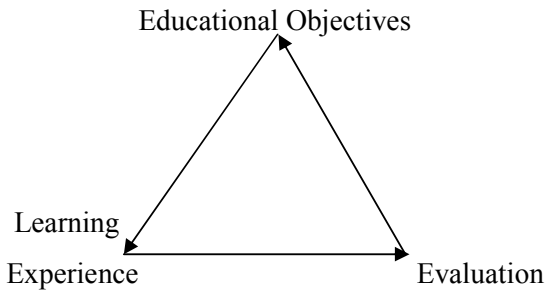
Before teaching the class, a teacher decides some goals, and to achieve these goals. He determines some mediums, in which mainly teaching techniques and syllabus occurs. In the end, he collects evidences, which tells him the limitations of object achievement, by which feed back of used teaching-objects and teaching technique is got by teacher. This tripolar process of teaching is called 'Evolutionary Approach'.

This type of evolutionary approach is a social and psychological process, which gives base to entire teaching process.

Technically three poles of this tripolar process can be displayed in form of figure shown as follows.

First pole of this triangle is related with teaching the class. Second pole is related with learning experience or desired changes occurred by using this. These changes are according to objectives. Third pole is related with evaluation, in which

evidences are collected to confirm the limits of objective achievement through examination.



In this way these poles are not only related but also dependent with each other. This is, the process by which it is confirmed that till which limit objectives has achieved, learning experience given in classroom be effective till which limit goals of teaching has achieved, it is unremitting process and is an undivided part of complete teaching approach, in which teacher collects the evidences about change of behaviour of a student and describes it.

First Phase-objectives

In liberal form, object is a statement which indicated desired behavioural changes. These are of two types –

(i) Educational objectives

(ii) Teaching objectives

Educational objectives are related with those desired behavioural changes whose area is broad, comprehensive and general. Its base is philosophical. These are not directly connected to learning process, even these are related with complete education. Its nature is formal, indirect and theoretical. To achieve these a long time period is needed.

Teaching objectives are related with those desired behavioural changes whose area is limited, determined and special. Its base is psychological. It is directly related with learning process. These are practical, creative and direct. These can be achieved in short time period of school.

In definition of educational objectives, B.S. Bloom cleared it in this way, "Educational objectives are not only the goals towards which the curriculum is shaped and towards which Instruction is guided, but they are also goals that provides the detailed specification for the construction and area of evaluation techniques".

NCERT cleared the teaching objectives in this way, “An objective is a point or end view of something towards which action is directed, a planned change ought through any activity, what we set out to do”.

4.5.7 MEANING OF THE TERM INSTRUCTIONAL OBJECTIVES

At the time of imparting instructions i.e. teaching learning of a particular lesson unit or sub-unit of the object computer sciences, a teacher has to place before him some definite and very specific objectives for being attained within a specified classroom period and resources in hand. Through these so specific classroom teaching-learning objectives, known as instructional objectives, a teacher tries to bring desired changes in the behaviour of his pupils in this way, the term instructional objectives in relation to the teaching of computer sciences may be defined as a group of statements formulated by the teacher for describing what the pupils are expected to do or will be able to do once the process of classroom instruction is over. Infect, instructional outcomes is the teaching learning product in the form of behavioural changes in the pupils that a teacher expects as a result of his instruction related with a particular lesson/unit of sub-unit of the subjects. Instructional objectives are thus nothing but descriptions of the pupils terminal behavior expected out of the on going classroom instruction.

Taxonomy of Instructional Objectives

The credit of analysation of teaching objectives in the knowledge field goes to Dr. B.S. Bloom (Chicago University) in 1956, who provided base to educational evaluation and syllabus change.

Krethwall, Bloom and Mesiha analysed teaching objective in emotional side in 1964. Similarly, taxonomy of teaching objectives of psycho-physical side is not available, either Simpson’s trial in this reference is remarkable.

In India, Regional College of Educational, Mysore represented an advanced form of teaching objectives, on the basis of taxonomy established by Bloom, which is knows as R.C.E.M system (Regional College of Educatinoal, Mysore, system).

Really taxonomy of Instructional objectives is a serialized categorization of human mind development in any form. Even educational taxonomy is a category of objectives used in different fields of education. This categorization is dependent on principles of education and psychology. By psychological point of view even educational taxonomy is a serialized categorization of human behaviour. The most

important use of educational taxonomy is to make accuracy of communication in educational objectives and related works.

In the field of education, the absence of clear definition of terms and concepts is always a subject of critics. Taxonomy of Instructional objectives can be much useful to remove unclearness of accuracy for communication.

Taxonomy of instructional objectives can make development in reference of regularity and consolidation of human development, as a result syllabus deciders can get help for determination of education level of subject matter. This condition is also for evaluation. For categorization of educational objectives, many trials were done. As result in primary form it was divided in two categories-

(1) General objectives

(2) Specific objectives

(1) General Objectives : General objectives are those, which are totally, related to teaching process; for example, problem solving, critical thinking and creativity in computer science.

(2) Specific Objectives : Specific objectives are generally limited to concepts and principle of subject for example, programming language, hardware, application programmes etc. in computer science come in this category.

Teachers expected general objectives as desired goals, but its unclearness did not provide help in use of these.

To remove this problem in 1948 a group of psychologists tried for categorization of some elements of human behaviour. This group constructed a taxonomy, which base was From Concrete of Abstract' and 'From Simple to Complex'.

4.5.8 BASIS OF DEVELOPING LEARNING EXPERIENCE

1. For evidence collection of goal-achievement firstly a specific form should be given to terminal behaviours after identification.
2. Desired behaviour should be defined clearly, by which use of unclear dictionary can be ignored.
3. Conditions for acquisition should be recognized.
4. After specialization of standards compare to know the volume of change.

Action verbs help to write objectives in behavioural form. But B.S. Bloom and RCEC System named these mental abilities or specification.

4.5.9 WRITING INSTRUCTIONAL OBJECTIVES IN BEHAVIOURAL TERMS

To write instructional objectives in behavioural terms, following steps can be used.

1. To formulate objective

Objectives	**Action Verbs**
	Cognitive Domain
Knowledge	To Recall, To Recognise, To Define, To State, To Write, To list, To Select.
Understanding or Comprehension	To Explain, To indicate, To Formulate, To Present, To Judge, To Classify, To Select, To Translate, Cite Example
Application	To Compute, To assess, To Demonstrate, To Construct, To Use, To Predict
Analysis	To Divide, To Conclude, To Compare, To Discriminate, To Separate, To Justify.
Synthesis	To Argue, To Discuss, To Generalise, To Summarise, Establish Relationship
Evaluation	To Decide, To Identify, To Criticize, To Defend, To Avoid, Detect Error.
	Affective Domain
Receiving	To Listen, To Accept, To Visulize, To Select
Responding	To Answer, To Develop, To List, To Select
Valuing	To Accept, To Influence, To Participate, To Recognise, To Indicate, To Decide, To Compare.
Conceptualization	To Differentiate, To Relate, To Demonstrate, To Analyse, To Compare
Organization	To Correlate, To Judge, To Determine, To Form
Characterization	To Revise, To Change, To Accept, To Integrate.
	Psychomotor Domain
Perception	To Construct, To Sketch
Set	To Design
Guided Response	To Inentify, To Fix
Mechanism	To Mend, To Drill
Complex Overt Response	To Connect, To Create, To Change, To Locate.

4.5.10 MODEL LESSON PLAN

Trainee teacher Name:	**Subject: Computer Science**
STD: XI	Date:
School:	**Unit: Introduction to Computer**
	Sub unit: Generations of Computer
	Duration: 45Minutes

General Instructional Objectives

The student

1. acquires knowledge of calculators,
2. acquires knowledge of computer,
3. acquires knowledge of parts of a computer and characteristics,
4. acquires knowledge of terms Bits and Bytes,
5. acquires knowledge of classification of computers,
6. acquires knowledge of generations of computers and different types of computers.
7. understands
   a) the reason why the computer has lot of applications.
   b) the differences between analog and digital computer
8. applies the scientific knowledge to calculate the total number of bits in 1 kilobyte.
9. develops skill in selecting a suitable electronic component accurately from the diagram shown.
10. develops attitude towards computer science by showing curiosity in selecting a suitable electronic component from the chart shown.

Specific instructional objectives:

The student,

1. recalls the terms a) Calculator b) Computer
2. recognize the
   a) definition of computer
   b) main parts or characteristics of a computer
   c) terms Bits and Bytes
   d) classification of computers & computer generation
   e) different types of computers
3. gives reasons, why a computer has lot of applications
4. differentiates between analog and digital computer

5. shows curiosity in selecting the suitable component from the chart

Teaching aids

1. Blackboard
2. Chart
3. Diagrams
4. Real objects
5. Flash cards

Specifications	**Teaching aids**	**Teaching and Learning Experiences**	**Evaluation**
Stage I : Motivation			
Recalls	Calculator	What is the name of the of the device used to solve mathematical problems? Students said: calculator sir, mobile phone sir	
Recalls	Computer	Mention any other name or other name of the device used to perform calculations with speed and accuracy	
Stage II : Presentation			
Recognizes		Teacher explains what a computer is. Computer is an electronic machine or device for storing, processing and analyzing data, following a set of instructions given to it by humans – A few applications of computers	What is a computer? Why do you need it?
Recognizes	(diagram)	With the help of a Chart the main parts of a computer are explained	Mention a few examples for output devices.

Recognizes	Chart Chart	The functional components of computers are explained. Input unit: Punch card, Tape reader etc – CPU: Control Unit – Arithmetic and logical unit Memory unit – output unit Card punch machine - magnetic tapes - visual display unit - Printers - Graph Plotters etc. output unit Card punch machine - magnetic tapes visual display unit - Printers - Graph Plotters etc Characteristics of computers High speed - Greater Accuracy Storage capacity- Automation, Versatility, Endurance	What are the input devices? What are the input devices? What are the characteristics of a computer?
Calculates		The teacher explains the storage capacity of the computers: 8 bits = 1 BYTE 1024BYTE = 1 KB 1024KB = 1MB 1000MB = 1GB	How many bites are equal to 1 Kilobyte?
Recognises	chart	The teacher explains the classification of computers: Supercomputer, main frames, min-micro systems depending on speed, word length and capacity of memory	How are computers classified?
Recognises	Chart	The teacher explains the generations of computers: generation-I generation - vacuum tube - ENIAC (Electronic Numerical Integrator and Calculator) by Eckert and Mauchly in 1946 EDVAC (Electronic Discrete Variable Automatic Computer) UNIVAC-I, UNIVAC- II (Universal Automatic, Computer) IBM in 1953 Second generation - Transistor Generation III - Integrated circuit units 1960-1970 speed - cost it reduced small size Generations - IV VLSI - micro-processors	Choose the correct answer from the following: The first generation uses a) Vacuum tubes b) Transistors c)IC d) Modulators

		Generations – V Artificial intelligence	
Recognises	Chart	Teacher explains the different types of computers: Analog computer - Digital Computer - and Hybrid Computer – Analog - Greek word means similar-similarities in the form of current or voltage	What is a digital computer?
Stage III - Review			
		The teacher ask questions to the students	Computer- definition - parts of computers - characteristics - classification of computer - generations - types of computer - Analog - Digital - Hybrid.
Stage IV : Assignment			
		1. Write an essay on 'Generations of computers? 2. Explain the different types of computers. 3. With a block diagram explain the main parts of a Digital computer system.	

4.5.11 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

9. 'To Classify' is the action verb for the _____ objective

10. 'To Predict' is the action verb for the _____ objective

11. Receiving, Responding and Valuing are the objectives in the _____domain

12. Perception, Set, Guided Response and Mechanism are the objectives of _____domain

4.6 METHODS OF TEACHING

Introduction

The method of teaching refers to the regular ways or orderly procedure employed by the teacher in guiding the pupils, in order to accomplish the objectives of learning situations. Different methods of teaching have been proposed by different educational thinkers in education. It is desirable for the teacher to know all of them, so that he can make a rational choice for himself in a given situation. The various methods of teaching Computer Science are as follows:

1 Lecture
2 Demonstration
3 Lecture-demonstration
4 Problem solving
5 Project method
6 Scientific method
7 Analytic method
8 Synthetic method

4.6.1 LECTURE METHOD

The lecture method has been the earliest known methods of instruction. Books were not available then and manuscripts were rare and hence lecture method was used for instruction.

Lecture means teaching a lesson in the form of speech or talk. The teacher delivers a lecture on a particular topic and the students keep listening in an idle manner.

Characteristics of lecture method

- Useful for higher classes
- It is easy, brief and attractive for teacher
- More information can be given in a short time period
- More number of students can listen and prepare notes
- The argumentative flow of the subject is restricted
- The flow of thought is maintained and the teacher tells about many new things
- It is a convenient method for the teacher
- The teacher is always alert

Advantages

- The proper orientation of the subject can be presented. The general outline of the scope of the subject can be brought out.
- Many facts can be presented in a short time in an impressive way
- It is possible to stimulate interest in the subject
- Spoken word has greater weight than books
- The language may be made suitable to all the members of the audience
- It facilitates inter-disciplinary approach to topics

Limitations

- It is waste of time to repeat the matter already present in books.
- The teacher to make the lecture impressive may care more for manner and style rather than matter
- If the lecturer is very fast, the pupils cannot easily take notes and follow the lecture
- Lectures decrease the initiative of pupils and their problem solving attitude
- Dictation would become prominent in the course of lectures

To make a lecture effective:

- Matter of the lecture should be systematized and summary developed at each stage
- The objective, the outline of the lecture should be emphasized
- The speed must be measured and considered
- Important points must be emphasized by loud and impressive statements
- The manner of presentation should be cheerful
- Pronunciation must be as far as possible approaching the correct one
- Pupils should be encouraged to take notes

Suggestions

- Make use of the black board where and whenever required
- Proper teaching aids should be used
- More stress should be laid on the principles of generalization
- The students should be given work to do so that they make use of their previous knowledge and acquire more knowledge on basis of their hardwork and experience

- In order to keep them active, questions should be put up to the students from time to time

4.6.2 DEMONSTRATION METHOD

In this method, the spoken word is supplemented with demonstration using varied aids resulting in auditory and visual learning. It involves getting answers from pupils as the demonstration proceeds gradually in stages.

By the help of this method, the student himself makes observation and acquires permanent and true knowledge. The student makes observations of nature in gardens, homes, in the groups, in the lab at schools and acquires firsthand knowledge. The teacher only encourages to make observations and students act accordingly.

Characteristics

- This method helps students to seek, think, give logic and to convey their thoughts independently
- The students are able to learn the similarities and dissimilarities of objects clearly and easily
- The work of the teacher is made easy
- The acquired knowledge is from natural resources and is thus permanent
- Develops the interest of the students in the subjects

Advantages

- Much matter can be covered in a short time
- Much time and energy of pupils and teacher is saved
- Only one set of apparatus is required , so it is economical
- Delicate and dangerous experiments which requires delicate manipulations can be performed by the teacher only with pupils as active observers
- Demonstration will stimulate the thoughts of pupil
- By the expression of the pupils, the method of delivery of lecture could be varied to suit the needs of the learner

Precautions

- All the aids must be arranged in the order in which they are to be used
- The experiments must be simple and effective and must not take a long time
- The simple experiments should be chosen in preference to complicated ones
- When effects are of small magnitude, they must be shown on a magnified scale, with suitable aids

- Any demonstration made must be with a purpose and the definite objective clearly stated
- All the pupil should be able to see the demonstration
- Pupils also may be made to assist in the demonstration

Common errors in good demonstration

- The apparatus may not be ready for use
- The teacher may not be able to link demonstration with subject matter
- Black board may not be properly used
- The language used may be difficult
- Questions may not be of the right type
- The teachet may not be able ti fix the attention of students

Demerits

- Students are devoid of doing practical work
- It seems that all students see same facts but it does not mean thay follow it

This method can prove to be the best method if the teacher takes active participation of students.

Suggestions

- Prior to encourage the students for observation, the teacher himself should check and observe things properly
- Interest and curiosity should be developed in students prior to making observations
- The students should be given full freedom during observaion
- when required the teacher should pinpoint and put up questions

4.6.3 LECTURE -DEMONSTRATION METHOD

This method of teaching is sometimes also referred to as lecture-cum-Demonstration method. This is considered to be a superior method of teaching in comparison to lecture method. In lecture method the teacher speaks and students listen so it is one way traffic of flow of ideas and students are only passive listeners. This one sidedness is the major drawback of lecture method. A teaching method is considered better if both teacher and taught are active participants in the process of teaching. This particular aspect is taken care of in demonstration method.

This lecture-demonstration method is used by the Computer science teachers for imparting Computer Science education in class-room. By using this method it is possible to easily impart concrete experiences to students during the course of a lesson when the teacher wants to explain some abstract points. This method combines the instructional strategy of 'information imparting' and 'showing low'. This method combines the advantages of both the lecture method and the demonstration method.

4.6.4 PROJECT METHOD

- This method is based on the principle of learning by doing, and learning by living.
- In this method, school curriculum and contents of studies are considered from pupil's point of view
- It also illustrates problem solving method
- It is a pupil centered method
- The students work out problems selected by themselves, investigate them and solve them in groups or individually
- The teacher act as a guide and instructor

Definition

"A project is a problematic act carried to completion in its natural setting"

- Stevenson

"A project is a whole-hearted purposeful activity proceeding in social environment"

- Kilpatrick

"It is a unit of activity in which pupils are made responsible for planning and purposing"

-Parker

Steps involved in a Project

1. Providing a situation to propose a project

Many opportunities should be given to students to express their ideas and to have discussions among themselves. While choosing a problem the teacher should know that it is real need of students.

2. Planning

The whole project should be planned with common discussions between students and teacher. Every student should be encouraged to take part in discussion.

3. Executing

Work should be distributed according to age, interest and ability of every student. The teacher should see that every child is involved in the completion of the project.

4. Evaluating

When the project is complete, students should have a discussion over it with the help of teacher. Deficiencies and weak points should be discussed.

5. Recording

The complete record of the project should be kept i.e. how they planned, what were their duties, to whom they were assigned, how they discussed the project, the solutions and the short-comings were recorded.

Merits

1. It is based on three laws of learning i.e. law of readiness, law of exercise, law of effect
2. It develops among students self confidence
3. Correlation of various subjects is achieved
4. Problem solving method is stressed
5. Learning travels from hand to head and is therefore retained for a longer time

Demerits

1. It is time consuming
2. Work load on teacher is increased a lot
3. There is no provision for drill and practice
4. It is expensive

Criteria of selecting a project

1. It should have definite educational value
2. It should have according to need and ability of students
3. It should be selected by students
4. It should provide purposeful activity
5. It should be challenging

Role of the teacher

1. The teacher should act as a friend and a guide
2. The teacher should provide work to every child
3. Freedom of thought and work should be provided
4. The teacher should see that pupils do not lose interest in the project

5. The teacher should suggest books for study

4.6.5 ANALYTIC METHOD

1. Analysis means breaking up of subject matter
2. It starts from unknown to known facts
3. This method helps to break the complex problem into simpler ones
4. The students by this method develop the ability to attack upon the problem and analyze it into simpler form
5. The spirit of investigation and critical reasoning is developed by this method
6. It increases individual thinking
7. New facts are discovered by the objective approach of students
8. It is scientific approach to learning
9. This method is formational. It helps to develop some skills among the students

Merits

1. This is an objective method, so no doubts are left in the minds of the students.
2. The students develop original thinking and reasoning. The spirit of inquiry is inculcated.
3. It develops practical abilities among students.
4. It develops democratic atmosphere as students discover the facts and the teacher acts as their guide and friend.
5. It decreases the possibilities of rote memorization.
6. There is always relationship between the student and the teacher.
7. It makes student active participant in teaching learning process.

Demerits

1. It demands too much from the students
2. It is suitable for small children.
3. It is a lengthy method. The whole syllabus cannot be covered by this method. It involves trial and error.

4.6.6. SYNTHETIC METHOD

1. It binds different known facts into unknown facts.
2. It leads from known to unknown facts

Merits

1. It is a concise and fast method. The syllabus can easily be covered by this method.
2. Known facts are displayed

3. It can be used even for small children
4. It requires memorization
5. No trial or error is there as there is no objective approach
6. It does not demand much from the students

Demerits

1. It develops many doubts in the minds of the students
2. It does not develop the ability to investigate and attack a problem or individual learning
3. It is not a scientific way of learning
4. It encourages rote memorization
5. Intimate teacher student relationship is not developed
6. The students remain inactive

4.6.7 SCIENTIFIC METHOD OR PROBLEM SOLVING METHOD

Any method of solving a problem systematically and scientifically may be called scientific.

Scientific method refers to a techniques for investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. To be termed scientific, a method of inquiry must be used.

A scientific method consists of the collection of data through observation and experimentation, and the formulation and testing of hypotheses.

Steps in Problem solving:

(1) Ability 'to sense the problem and emergence of problem:

- This arises due to students reading of lessons, their interest during teacher's discussions in the class, through field trips or by seeing film.
- At this stage the teacher can raise a problem by providing situation.
- It should be however, confirmed by the teacher.
- That problem is purposeful and is, according to the need and requirements of students; availability of material relevant to the problem should also be considered.
- It should be from majority of students' side and better if it fits into curriculum.

(2) Defining the problem:

- Here the students need much of teacher's help, as children may find it difficult to define the problem themselves.
- Different statements can be given about it.

- The most essential feature of the defining of problem is that students should understand the problem and grasp it.

(3) Collecting the data:

- When the students have defined the problem they know the possible solution.
- Now the teacher should help the students to collect the relevant data.
- They may have to read extra books, draw charts, prepare models, make field trips.
- They can discuss it with experts.
- It should be by observation, study and experiment.

(**4) Interpreting the data**:

- When the students have collected the data, they have now to eliminate unnecessary material.
- This is an important and bit difficult step and it is possible only if the students do not divert their attention from the main problem.
- This step involves thinking and reasoning
- Judgement should not be given till sufficient data are collected and organized in a systematic way.
- The teacher should prepare the students in such a way that they do not quickly jump to conclusion.

(5) Consideration of evidence leading to formation of conclusions:

- After the data are collected and organized, the students should move towards final solutions.
- The teacher should see that students should complete this step by their essential thinking.
- Now individual differences will appear as some bright students will find solution easily whereas others may take longer time.

(6) Testing Conclusions or verification of solution

- The results are to be verified to prove their correctness.
- This can be done by applying the results to other situations or some demonstration can be done by the teacher.

However, the scientific method involves the following steps:

- Sensing the problem.
- Defining the problem.

- Analyzing the problem.
- Collecting relevant data concerning the problem.
- Interpreting the data.
- Formulating the hypothesis,
- Selecting and testing the most likely hypothesis
- Drawing conclusion, to make generalization
- Application of the final results to the new situation

Advantages of the problem solving method

- The students discover new knowledge
- They learn how to act in a new situation
- They learn how to make certain things
- They learn how to get out of a difficult situation
- They learn to verify opinion
- It provides opportunity to satisfy their curiosity
- They become able to limit and define problems
- They learn to invent new devices
- They learn to create new ideas
- It develops the habit of extra study
- It takes into account the individual difference

Procedures of Problem Solving

The following two procedures are for problem solving:

(i). The inductive approach

(ii). The deductive approach

4.6.8 THE INDUCTIVE APPROACH

This method requires the study and careful examination of particular facts to deduce a general principle. Pupils are actively engaged in thinking for themselves and discovered new rule, generalization etc.The students draw generalization from particular principles, from observed rules and from instances.

Steps involved

1. Sensing the problem

The pupils define the problem

2. Analysing the situation

The situation is analysed and relevant information is sought. It may require book study, references, making field trips etc.

3. Organising information

Under the guidance of the teacher the pupils organise the information collected

4. Framing solution

The children frame possible solutions. The teacher acts as guide.

5. Eliminating

Possible solutions are kept and others are eliminated

6. Verification

The solutions are applied to the situation and results are checked. The procedure is related until a correct solution is discovered.

Merits

- It promotes mental ability
- The pupils actively participates in the learning process
- Self learning is promoted
- Children learns to solve the problem, attack them and plan them to reach the generalisation.
- The process gives the students opportunity to be self dependent

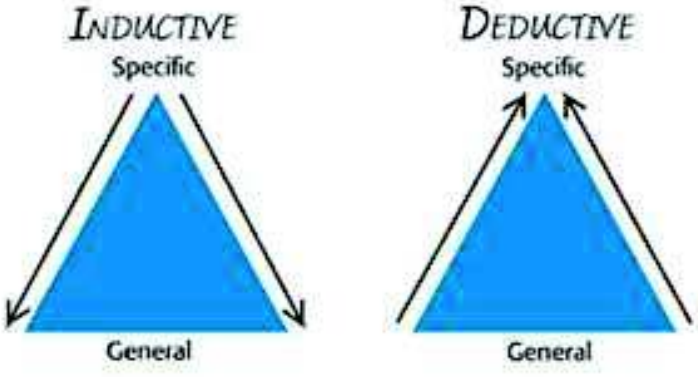
Demerits

- It is an incomplete method
- It is slow and a lengthy method

4.6.9 THE DEDUCTIVE APPROACH

It suggests the verification of general principles, rules, definitions already learnt. It should be noted that this method has two functions to perform:

- Drawing inferences from general principles studied
- Explaining particular facts with the help of general principles, laws etc.



Steps

The following steps are used in it

1. Understanding the problem

The pupils understand the problem. They define and formulate it

2. Collecting information

The pupils gather information about the problem

3. Reviewing

Principles, generalizations are reviewed to find facts which may be applied to find a suitble solution, conclusion or result.

4. Drawing inferences

The principle, rule or generalization is applied to the case and inferences are drawn that the problem falls under such and such principle.

5. Verification

The principle is applied to the case. If it solves the problem, it is accepted otherwise the procedure is repeated to find the correct one.

Merits

- Teacher's work is simplified. He gives general principles and the students have to verify them
- This is fast and economical
- This is suitable for small children who cannot prove the facts by themselves
- There is no danger of arriving at wrong and incomplete results

Demerits

- As ready made material is supplied, children are deprived of exploring the facts themselves
- It encourages memorisation
- Self confidence is not encoureged
- It does not motivate the students as facts are not found by them

Comparison of Inductive & Deductive approaches

Inductive Approach	Deductive Approach
1. It leads from particular to general concrete to abstract.	If leads from general to particular abstract to concrete.
2. It used for establishing a law (or) a theorem.	It is used for drilling.
3. It is a lengthy approach.	Shortcut approach
4. It develops creativity of the learners.	It develops rote memory.
5. It is a time consuming approach	It is a time saving approach
6. It is the forerunner of deductive approach	It is the follower of inductive approach
7. It creates interest among the learners. It is a developmental process.	It creates monotony among the students.

4.6.10 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

13.The project method is based on the principle of _____

14._____method is based on the principle of 'from Unknown to Known'

15._____ method is based on the principle of 'from particular to general'

4.7 INDIVIDUALIZED INSTRUCTION

Individualized instruction is a method of instruction in which content, instructional technology (such as materials) and pace of learning are based upon the abilities and interests of each individual learner.

4.7.1 PROGRAMMED LEARNING

Introduction

Programmed learning is an educational innovation and auto instructional device. It has been coined from principles of operant learning by B.F.Skinner. He claimed that desirable changes can be brought out by giving a continuous feedback or reinforcement for desired responses. It is also named as programmed instruction and instructional technology.

Characteristics of Programmed learning

- It is a teaching method and not a test. It helps the students in learning a material
- It is not an audio visual aid. It is a part of educational technology
- It is not the solution of educational problems. It is a new instructional strategy for the behaviour modification of the learner
- It cannot replace the teacher because only an effective teacher can prepare a good programme
- It requires more creativity and imaginative efforts to develop highly individualized instruction.

Principles of Programmed learning

1. Principle of small steps

The subject matter is broken down into a sequence of small steps. A student can take a step at a time.

2. Principle of active responding

A student learns better if he actively participates in the lesson and he learns best if he is actively responding while learning. It is an integral part of learning.

3. Principle of immediate confirmation

The student learns best if his response is confirmed immediately. The confirmation provides the reinforcement to the learner.

4. Principle of self pacing

In programmed learning each student proceeds at his own rate. This principle is based on individual differences in the process of teaching and learning.

5. Principle of evaluation

It helps students to learn and grasp the material given in each frame. The aim of this arrangement is not to test the student but to improve the quality of programmed materials through checking the number of errors at each step.

Types of programming

The following are the types of programming:

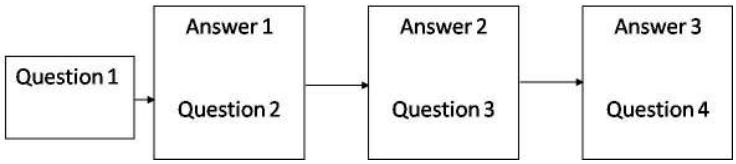
1. Linear Programming of B.F.Skinner
2. Branched programming of Norman Crowder
3. Mathetics programming of Thomas F.Gilbert

Linear Programming

In the linear style, the subject matter is divided into very small steps, each of which is called a frame. The frames are numbered. The student is allowed to cover one frame at a time, responding to each one by one, getting feedback and going on in a straight line fashion. Every learner goes through the same series of tasks. But individual students may complete the programme at different rates according to their respective abilities.

When the student has given his response, he confirms it with the correct response provided in the programme. There is provision for self pacing. Therefore, the linear programmed learning has all the principles mentioned below:

1. Information given in small steps
2. Active responding by the student at each step
3. Immediate knowledge of results
4. Self pacing

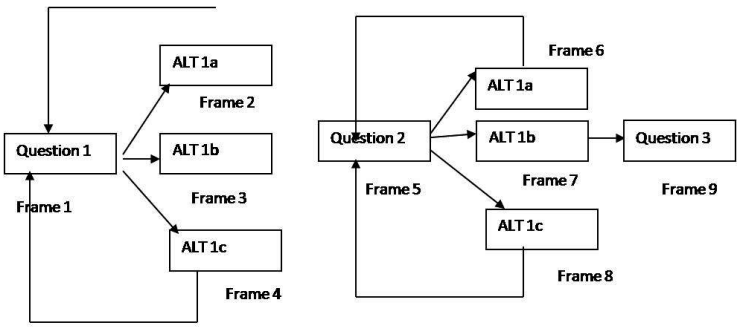


Branched Programming

The frame size and the amount of information given is larger that that of linear programme. The student starts by multiple choice questions designed to test the student's learning of the material.

If the student chooses the correct answer, he is told that his answer is correct and he is led to the next learning item.

If the answer is wrong he has to go through a discussion where he is told what was wrong with the answer. He is then taken to the original item and allowed to select the right response again.

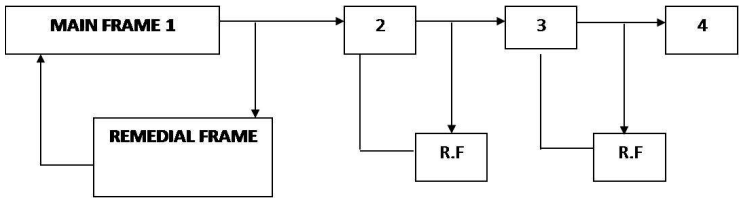


Techniques in Branch Programme

There are two techniques in which branch programme can be arranged. They are called Backward Branching and Forward Branching.

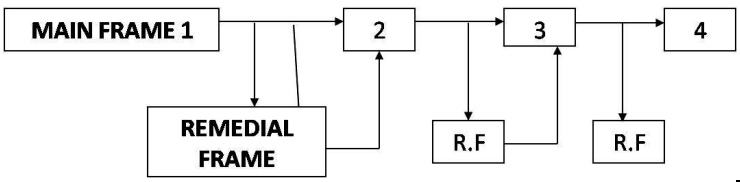
Backward Branching

The learner goes from first frame to second frame only if he makes correct response. If he makes an error, he is led to a remedial frame where he is given some more help in understanding the concept and in solving the solution by a better logic. He will then be directed to the original frame number one. He reads again, answers correctly in the light of remedial material received earlier. So the learner goes through the same frame twice, once before the remedial material and secondly after the remedial material.



Forward Branching

In this type, whether the learner is making correct response or wrong response, he will always be going to new pages, progressing from page to page. When he makes a wrong choice, he is directed to a remedial frame where his mistakes are fully explained, probably followed by another parallel question, from which he goes to the next frame in the main stream.



Steps in programming

Topic selection

The programmer should select the most familiar topic, otherwise he has to take the help of the subject expert. He should select a specified content or a small area of the subject matter.

Content outline

Its outline may be prepared which should cover all the materials on plans to teach. For this, the programmer has to refer to and examine relevant books and materials.

Instructional objectives

It involves both task description and task analysis. Task description is the description of terminal behaviours which the learner is expected to achieve. Task analysis is the series of component behavious that he is required to acquire in the process of achieving terminal behaviour.

Entry skill

The learner should have some pre requisite ability and skill to understand properly the new programme. This programme cannot be prepared without proper assessment of the entry skill.

Presentation of the material

Suitable format is to be decided for presenting the material from the educational point of view. Then the programmed material should be presented in a sequence of frames arranged as step towards terminal behaviour.

Student participation

Student participation is facilitated by presenting the programme in an interesting format.

Terminal behaviour test

It is known as performance assessment. This provides the feedback to the programme and shows the effectiveness of the instructional materials.

Revision

The programme may be revised on the basis of feedback. The instructional materials may be edited and modified according to the needs and requirements of the pupil.

Benefits

- To help students to learn by doing
- To provide the situation to learn at his own pace
- To help student to learn without the presence of a teacher
- To present the content in a controlled manner and in logically related steps
- To study by himself and assess his own performance by comparing it with the given answer.

Conclusion

It is self instructional material developed on the basis of psychological principles of teaching-learning. A rapid learner can cover the material quickly and the slow learner may proceed at his own pace. The analytical thinking and self direction of learners are also promoted through it.

4.7.2 COMPUTER ASSISTED INSTRUCTION

Computer-assisted instruction is a method of using computer technology in teaching and learning. Computer-assisted instruction (CAI) is an interactive instructional technique whereby a computer is used to present the instructional material and monitor the learning that takes place.

Computer Assisted Instruction

- Computer Assisted Instruction is nothing but giving instructions with the help of computers.
- In CAI, the activity of the learner is the most important attribute.
- CAI is nothing but learning with computers.
- It can be used to impart formal and non-formal education at all levels and also in all areas
- CAI has been developed from the formal principles of Programmed Instruction
- It is one of the types of Individualized Instruction
- CAI uses a combination of text, graphics, sound and video in enhancing the learning process

Development history of CAI

The earliest computer-aided instruction was invented in 1925 - Pressey's multiple-choice machine (developed by Sydney Pressey, Professor of Psychology at Ohio State University). Pressey's multiple-choice machine presented instruction,

tested the user, waited for an answer, provided immediate feedback, and recorded each attempt as data.

In 1950, Norman Crowder developed a process for the U.S. Air Force in which a CAI programme presented some content as text, tested the user, provided some feedback, and then *branched* to corrective instruction or new information based on supplied responses. Branching was thought to be an advance on Pressey's multiple-choice machine

Much influenced by theories of behaviourism, in 1954 at the University of Pittsburgh, Psychologist B. F. Skinner demonstrated a teaching machine for "reinforcing" - and not just teaching - spelling and arithmetic with a machine. In addition users, as reinforcement, may also access auditory material, listen to a passage as often as necessary then transcribe it. The machine then reveals the correct text. Students may listen to the passage again and again to discover the sources of any error and self-correct themselves.

Developers applied principles of data transmission and reinforcement theory to a variety of educational situations. Skinner used reinforcement theory to downplay the role of punishment in changing behaviour. Instead, he was convinced that behaviour could be altered by simply using positive and negative types of reinforcement. Positive reinforcers presented rewards (good grade or congratulatory comment) after the user achieved a desired behaviour. Negative reinforcers remove aversive stimuli after the user failed to achieve a desired behaviour. Crowder applied these ideas to ‘‘intrinsic programming" so that a user's responses determined the material to be presented next. The main advantage of intrinsic programming was that it did not waste the time of the fast learner with unnecessary repetition.

Early computer based teaching system to enter commercial production was the Self-Adaptive Keyboard Instructor (SAKI), developed by Gordon Pask and Robin McKinnon-Wood in 1956.

A project "The Programmed Logic for Automatic Teaching Operations (PLATO)" commenced at the University of Illinois in 1959. By the late 1960s, the PLATO system was using time-sharing computers to allow large numbers of people to interact with lesson modules created by the TUTOR programming language.

Subsequent developments in programmed instruction (CAI) arise from perspectives influenced by behaviourism and cognitive science. While teachers have mostly used

CAI for drill and practice especially in teaching mathematics and languages, there have been other users of CAIs as well.

4.7.3 STEPS INVOLVED IN THE DEVELOPMENT CAI PACKAGE

The sequence of the steps involved in the development of instructional materials may change according to the nature of the problem. The general steps involved in the development of CAI can be:

1. Analysis Phase
2. Design Phase
3. Programming Phase
4. Validation Phase

Analysis Phase:

Selection of a unit: The computer should be used creatively and judiciously since it demands more money resource than any other media.. If the teacher decided to write a programme for CAI, she should bear in mind: Why do we use a computer (CAI) approach. There should be a rationale for the use of a computer.

Content Analysis: The process of deciding the topic into sub-topics or sub-points is called content analysis.

Entry Behaviour: The analysis of the target group is very essential. Once the content and target group are analyzed, a teacher can sequence the concepts so that they are logically arranged. The specifications of the learner's entry bahaviour are to be finished.

Specification of objectives: It is like preparing a summary of the learning process in terms of the competencies to be learnt.

Development of evaluation measures: A statement of objectives describes the capability to be developed. If this description is clear, it helps us to design a test to assess how well the learner has acquired that capability.

Design Phase:

The analysis phase is followed by a creative phase, which is the design phase.

Development of modular structure: The whole package would be a set of various inter related modules. Though they are inter related, one can select modules to be learnt or the pre test may help the learner in selecting appropriate modules.

Development of flow chart: The flow chart becomes the link between the information and the screen presentation. It is a chart showing the relationship between the events, activities, concepts.

Designing frames: A module consists of a series of frames. Some of these will be criterion frames, teaching frames and some testing frames.

Criterion frames: It acts as a check that the teaching frames achieve their objectives. This is a test of the learner's knowledge.

Teaching frames: It contains all the information needed to complete the course.

Testing frames: These can be in the form of prompt or cue.

Preparing screens with reference to actual programming:

Once the frames are designed, they should be converted in a manner useful for screen display. Therefore, screen layout forms are designed at this stage.

The essential characteristics for screen display includes

- Screen layouts
- Text
- Graphics
- Timing
- Animation
- Sound
- User control

Programming Phase

The course ware author may perform the programming task or it could be performed by team of programmers. Generally, a teacher who does the instructional design of the CAI package may not possess programming expertise. Such a teacher is provided programming facility by special tools. These tools are called authoring tools.

Some fundamental features must be provided by any authoring system:

- Present text and questions on the screen
- Accept responses entered using a keyboard
- Analyze the responses
- Store details of responses and values of counters on a file
- Branch to other parts of the learning programme
- Provide feedback
- Interface with sub routines written in computer programming language

Validation Phase

It means testing the whole package. The following factors should be considered while evaluating the package:

- Content
- Accuracy
- Presentation
- Adherence to presentation standards and guidelines
- Use of the authoring language

It should be followed by evaluation by experts, testing, pilot study and field tryout.

4.7.4 MODES OF CAI

There are several kinds of CAI programmes that are available and the important ones are as follows

1. Drill and Practice
2. Tutorial Mode
3. Simulation Mode
4. Discovery Mode
5. Gaming Mode

Drill and Practice

In this mode, the computer presents the learner with a series of exercises which he or she does by giving some responses. It provides the learner some feedback about the answer (i.e. responses) in the form of a congratulatory message if it is right, or a corrective comment if it is wrong. Thus, CAI provides drill and practice with repetition at a pace that can be controlled by the learner. The computer proceeds only when mastery is achieved by the learner.

Tutorial Mode

In the tutorial mode, as in programmed instruction, information is presented in small bits followed by questions. The learner's response is analyzed by the computer and appropriate feedback is made available to him/her.

Simulation mode

Learning experiences regarding real life systems or phenomena are provided to the learners through this mode. The thing that cannot be brought into a classroom (real or imaginary) can be represented by simulations.

E.g: Aircraft, Fire safety

Discovery mode

This mode uses inductive approach to learning wherein the problems are presented and the learner solves them through trial and error.

Gaming mode

In gaming mode teaching can be imparted, through play or game.

Basic Assumptions of CAI

- CAI can be provided simultaneously even for 4000 students and thereby it facilitates individualized instruction
- Immediate feedback can be provided to the learners
- Teachers can use the data in making the best teaching strategy for the learner
- It is suitable for all types of teaching and learning activities

4.7.5 BENEFITS OF CAI

- Self pacing -allow students to proceed at their own pace
- Reteaching and reinforcing
- Personalized feedback of instruction
- Multimedia helps to understand difficult concepts through multi sensory approach
- Simulations
- Acquiring knowledge through games
- Great motivator
- One-to-one interaction
- Effective use of educational technology for drill and practice of basic skills
- Students learn more, and more rapidly in CAI courses
- Students feel more successful and motivated to learn and have increased self Confidence and self esteem
- Teachers and administrators can use computers and information technologies to improve their roles in the education process.

4.7.6 LIMITATIONS OF CAI

CAI has some limitations also, even though it has lot of advantages. They are

a. Lack of human qualities
b. Restricted text displays
c. Limited sensitivity to needs
d. A poor substitute for actual experience
e. Software limitations
f. Hardware limitations
g. Over use of multimedia may divert the attention from the content

h. Lack of infrastructure

4.7.7 ROLE OF THE TEACHER IN CAI

1. In CAI the role of the teacher has changed from the traditional method of delivering lectures to a supervisor or a guide
2. No computer can replace a teacher, as teacher's role is very important in the process of teaching and learning
3. Infact the CAI will definitely increase the scope and quality of contribution of teachers in the society
4. In CAI, the teacher has to play many roles like computer engineer, lesson writer and a system operator.

4.7.8 COMPUTER-MANAGED INSTRUCTION

Meaning

Computer-managed instruction is an instructional strategy whereby the computer is used to provide learning objectives, learning resources, and assessment of learner performance. It refers to the use of a computer system to manage information about learner performance and learning resources options.

Computer-managed instruction (CMI) aids the instructor in instructional management without actually doing the teaching.

Computer in Teaching Learning process

In computer managed instructions, the computer gathers, stores and manages information to guide students through individualized learning experience.

At the computer is being used in administrative and management, these days, such type of use of a computer is known as computer based learning, for example in distributing the salaries of the teachers and other employers.

Computer is not used directly in teaching – learning process, but it used as an helper in teaching learning process. If a teacher is made free by assigning his other duties to the computer such as administrative, managemental activities, then he can utilize his spare time in an effective manner in the classroom.

4.7.9 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

16. The linear programming was introduced by _____

17. The programmed Instruction is based on _____psychological principle.

18. Simulation is one of the modes of _____

19. Self-Adaptive Keyboard Instructor (SAKI) was developed by Gordon Pask and Robin McKinnon-Wood in the year_____

20. A The Programmed Logic for Automatic Teaching Operations (PLATO)" was introduced in the year_____

4.8 LET US SUM UP

Pedagogy is a *systematic* approach to creating an educational process that will lead to knowledge transfer - the appropriate reuse of knowledge and learning experiences gained in one setting to a variety of new situations. An effective pedagogy includes the content elements and the strategy for presenting that content; how the elements are assembled to construct a scaffold for learning based on the principles of cognitive psychology, and finally how to evaluate whether that process is working as intended and leading to increased learning. There is a long standing tradition that instruction is "delivered" in a classroom, from an expert standing at a podium in front of the room while the students scribble madly trying to take down everything of importance. But today's instructional technologies, coupled with cognitive research findings are transforming teaching and learning.

One of the most powerful movements in education today is towards "learner-centered" or "active learning". Active learning requires a shift from simply "delivering instruction" to setting the conditions for the *process* of engagement, application, syntheses and authentic understanding. Active learning can occur in any delivery format - classroom, blended or online. The common denominator is that students are "interacting" with their peers and real problems and issues in constructing knowledge and understanding.

4.9 UNIT- END ACTIVITIES

1. Describe the steps for annual planning
2. Describe steps for unit planning
3. What are the importance lesson plan?
4. Choose a topic of interest in Computer Science for XII Standard and write down the objectives and specific objectives for the topic.
5. How would you use lecture-demonstration method for teaching Computer Science for XI standard?
6. Describe the steps for problem solving method for teaching Computer Science.
7. Describe the steps for project method for teaching Computer Science.
8. How would you use analytic and Synthetic methods for teaching Computer Science?
9. What are the differences between Inductive and Deductive methods for teaching Computer Science?
10. What are the modes of CAI?\
11. Describe the steps for developing CAI package in Computer Science.
12. Describe the role of Teachers in CAI.
13. How would you use ICAI for teaching Computer Science?
14. What are the merits and limitations of CAI?
15. What do you mean by Computer Managed Instruction?

4.10 ANSWERS TO CHECK YOUR PROGRESS

1.beginning	11.Affective
2.Year plan	12.Psycho-Motor
3.Year Plan	13.Learning by Activity
4.Year plan	14.Analytic
5.unit	15.Inductive
6.objectives	16.S.E.Skinner
7.units	17.operant conditioning
8.Unit planning	18.CAI
9.Comprehension	19.1956
10 Application	20. 1959

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UNIT V INSTRUCTIONAL AIDS

Structure

5.1. INTRODUCTION

You know that language has many limitations that may contribute to learning difficulty. Sensory experience forms the foundation for intellectual activity. Sensory aids effect an economy of time in learning. Generally modern educators recognize the Audio-Visual materials whose basic values as concreteness, enrichment and dynamic interest. Especially in the teaching of Computer Science, even the most abstract concept can be presented to the pupils in a concrete way by means of more than one aid. In this lesson you will be exposed to the use of Audio Visual Aids in the teaching of Computer Science .

5.2 .OBJECTIVES

After Studying this unit, you will be able to

1. Understand the concept of Instructional aids
2. Indentify the types of . Instructional aids
3. Understand the Functions Of Instructional Aids
4. Explain the Procedure of Using Visual media
5. Understand the procedure of using Interactive White Boards
6. Explain the procedure preparing multimedia presentation

5.3 INSTRUCTIONAL AIDS IN THE TEACHING OF COMPUTER SCIENCE

Now a days knowledge is growing very fast. Our children are learning more than what we have learnt. Hence the problem gets new dimension now. We teachers have to teach more to more. That is, we have to teach more content to more number of students. For solving this problem, the teacher has to use new teaching techniques and Multi Media approach in his teaching so as to cater the needs of all students. Audio-Visual Aids are intended to help the teacher to give more life and impressiveness to his teaching. The various Audio-Visual Aids are intended to make the subject matter more attractive to the pupils.

Some of them have a wrong notion about Audio-Visual Aids that it will isolate the teacher. But it is a wrong assumption. Audio-Visual Aids will assist you in your teaching, make your teaching as learning process more effective and meaningful. The teacher will be the centre of the scheme.

Audio visual aids are sensitive tools used in teaching and as avenues for learning. These are planned educational materials that appeal to the senses of the people and quicken learning facilities for clear understanding

Definitions:

According to Kinder S. James*: Audio visual aids are any device which can be used to make the learning experience more concrete, more realistic and more dynamic.*

According to Carter.v.Good**:** audio visual aids are those aids which help *in completing the triangular process of learning that is motivation, classification and stimulation.*

According to Edger Dale: *audio visual aids are those devices by the use of which communication of ideas between persons and groups in various teaching and training situations is helped. These are also termed as multi sensory materials.*

According to KP. Neeraja*:* an audio visual aid is an instructional device in which the message can be heard as well as seen

GATE WAYS OF KNOWLEDGE

The eyes and ears are the most important of the gate ways of human knowledge. What we see and hear we grasp quickly and understand perfectly. It is said that 83% of our knowledge is acquired through the eye gate and 11% through the ear gate, while the other three or smell, taste and touch account for 3.5% 1% and 1.5% respectively. Education which makes full use of the ear gate and the eye gate is spoken of as Audio-Visual Education, and whatever used in this respect is and Audio-Visual Aid.

PSYCHOLOGY OF USING TEACHING AIDS

There is an old saying which reads:

i) I hear, I forget

ii) I see, I remember

iii) I do, I understand

I HEAR, I FORGET

The traditional teacher depended too much on verbal exposition. The pupil hears and forgets. It is necessary particularly in science and technology that knowledge gained by an individual is accurate, where considerable visualization of objects and processes is needed and formation of accurate concepts is essential.

I SEE, I REMEMBER

As a sensory organ, the eye is very highly developed when compared to other sensory organs. Our eye has binocular vision. Hence it is quite natural that the knowledge gained through the sense of sight is more vivid, accurate and permanent. Hence what one sees, one remembers. As I have already mentioned 83% of our knowledge is gained through our eyes.

I DO, I UNDERSTAND

When one is engaged in any practical activity, involving physical work (doing practical work in the laboratory, workshop or in the field) all the senses are used to perceive. Knowledge is through all the senses. Project method (do you remember? If not, go through your package having Project Method) is an ideal method of making the pupil acquire complete knowledge.

5.3.1 FUNCTIONS OF INSTRUCTIONAL AIDS

Instructional material must be seen in their relationship to teaching as a whole and to the learning process as a whole, until the teacher understands the relationship between audio visual material and teaching learning process.

Instructional materials are produced, distributed and used as planned components of educational programs. It helps the process of learning that is motivation, classification and stimulation. A.V. aids are multisensory materials which motivate and stimulate the individual. It makes dynamic learning experience more concrete realistic and clarity. It provides significant gains in thinking and reasoning**.**

I. Motivation

Instructional aids present the knowledge in the concrete form by attracting the attention of the pupils. It provides motivation and curiosity to the pupils in learning the subject. The pupils listen with attention and learn easily the lesson taught by using Instructional aids than the traditional lecture method.

II. Principle Of Activity

The pupil gets various opportunities of doing various activities by using Audio-Visual Aids. when Audio-Visual Aids are used while teaching a lesson, the pupils talk, ask questions and discuss. This stimulates their various sense organs. As a result of this, their interest in the lesson prevails and they learn the most difficult things in a natural way without any difficulty.

III. Clarification

The use of Instructional aids clarifies the most difficult contents. Its only reason is that whatever the pupils hear, they also see it with their own eyes. After seeing with their own eyes, all the confusions are eliminated and they acquire the knowledge with precision.

IV. Fixation

With the help of Instructional aids ,knowledge is fixed firm in the pupils minds.

V. Meaning Experience

With the help of Instructional aids, the lesson is taught to the pupils in a concrete form. Every pupils tries to understand correctly by seeing and touching an object. This makes the lesson easy, interesting and entertaining and all the pupils acquire it happily

VI. Discouragement To Cramming

By using Instructional aids, the pupil take interest in the development of the lesson and they acquire the knowledge by doing. This makes the learnt knowledge definite and stabilized. There is no need of cramming anything.

VII. Increase In Vocabulary

The use of Instructional aids increases vocabulary of the pupils. Its reason is that while using radio, telephone, television and cinema, new terms are used and they acquire them.

VIII. Efficiency In Teaching

The use of Instructional aids causes efficiency in teaching. Also the teaching becomes more effective. In other words, those minute things and difficult ideas which a pupil is unable to understand with chalk and talk are followed easily by using Instructional aids. it means to say, dry and disinteresting subjects and topics can be made easy, interesting and precise by Instructional aids.

From the above discussion, it is clear that the Instructional aids make teaching effective. It helps the pupils in learning with low I.Q.

5.3.2 CHARACTERISTICS OF INSTRUCTIONAL AIDS OR AIUDIO-VISUAL AIDS

J.K. Davies has suggested the following five characteristics of Audio-Visual Aids:

1. Audio-Visual Aids help in developing perception.
2. It helps in developing understanding. It enables the pupils to acquire correct knowledge.
3. Audio-Visual Aids help in transfer of training.
4. These are helpful in acquiring knowledge and providing reinforcement.
5. Audio-Visual Aids help in developing retention. Its use facilitates assimilation of knowledge.

5.3.3 INSTRUCTIONAL AIDS USED IN TEACHING

The Instructional aids used in the teaching can be classified into the following ways:

a. Traditional Aids: Blackboard/chalkboard, books, periodicals.

b. Visual Aids: Objects, picture, map, figure, chart, posters, model, bulletin board, flannel board, globe, graph or any other type of graphics such as| diagrams, cut-outs, cartoons, etc.

c. Mechanical Aids:

   i. Audio: Radio, tape recorder, teaching machine.

   ii. Visual: Projector, epidiascope, film strips, motion picture, etc.

   iii. Audio-Visual: Films, television, video, cassettes, etc. Visual Material Aids: Use of Chart: The most commonly used types of charts include outline charts, tabular charts, flow charts and organization charts. Flip charts and flow charts are also being used.

5.3.4 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

1. The most important of the gate ways of human knowledge are ----------
2. The multisensory instructional materials are **----------**
3. ---------- Aids help in transfer of training.

5.4 VISUAL MEDIA

Visual media serves to channel message from the source to receiver. The message will be deliverd and poured into visual symbols.In addition,the function of the visual media are to attract attention, serving to clarify ideas,illutrate or embellish facts that may be quickly forgotten if not visualised. The Visual Aids are as follows.

Visual Aids: Objects, picture, map, figure, chart, posters, model, bulletin board, flannel board, globe, graph or any other type of graphics such as| diagrams, cut-outs, cartoons, etc

5.4.1 CHALK BOARD

A **chalkboard** or **blackboard** is a reusable writing surface on which text or drawings are made with chalk or other erasable markers. Blackboards were originally made of smooth, thin sheets of black or dark grey slate stone. Modern versions are often green or brown and are thus sometimes called a green board or brownboard instead.

A blackboard can simply be a piece of board painted with matte dark paint (usually black or dark green). A more modern variation consists of a coiled sheet of plastic drawn across two parallel rollers, which can be scrolled to create additional writing space while saving what has been written. The highest grade chalkboards are made of a rougher version porcelain enameled steel (black, green, blue or sometimes other colours). Porcelain is very hard wearing and chalkboards made of porcelain usually last 10-20 years in intensive use.

Blackboards and Whiteboards

Many people underestimate the value of a blackboard and whiteboards. Boards are an effective teaching tool and visual aid. Some uses for boards include:

- Outlining the day's topics.
- Listing the major points of your lecture or lab.
- Summarizing ideas raised in class discussion.
- Spelling difficult names, words or other new terminology.
- Drawing diagrams, graphs and timelines.
- Showing formulas, computations, or steps in a proof.

Merits

- Can validate students' responses.
- Can help you to pace your lecture.
- Very little can go wrong with this low-tech tool.

Demerits

- Can be difficult to write on and can be messy.
- Can lead to stream-of-consciousness-based teaching.

Tips for Using the Black or White Boards

- Practice writing on boards before you start teaching.
- Put information on the boards before class if possible.
- Bring a back up dry erase marker to class because the one in teh classroom may not work properly.
- Use a chalk holder and have a cloth handy so that you can wipe chalk dust from your hands.
- Break the chalk in half or hold it at a 45° angle in order to avoid squeaking.
- Read aloud what you have written on the board after you have finished writing it and you are once again facing the students.
- Use the most visible part of the board for the most important points (the upper left-hand corner of the board is often the most prominent spot).

Structure your board work. Use titles, headings, underlining, circling, boxing, and capital letters to differentiate and emphasize items. You can also organize your work by dividing the board into sections.

5.4.2 CHARTS

These visual symbols used for summarizing, comparing, contrasting or performing other services in explaining subject matter. A chart is a combination of pictorial, graphic, numerical or vertical material, which presents a clear summary.Chart is defined as a visual aid which depicts pictorial and written key information in systematic way to summarize, compare, ex: anatomical charts and figure, diagrams.

PURPOSES OF CHARTS:

Charts serve the following purpose:

1. For showing relationship by means of facts, figures and statistics.
2. For presenting materials symbolically.

3. For summarizing information.
4. For showing continuity in process.
5. For presenting abstract ideas in visual form.
6. For showing development of structure.
7. For creating problems and stimulating thinking.
8. For encouraging utilization of other media of communication.
9. For motivating the students.

Types of charts:

1. **Narrative chart**: Arrangement of facts and ideas for expressing the events in the process or development of a significant issue to its point of resolution or we can show an improvement over a period of years.

2 . **The cause and effective chart**: Arrangement of facts and ideas for expressing the relationship between rights and responsibilities or between a complex of conditions and change or conflict.

3. **The chain chart**: arrangement of facts and ideas for expressing transitions or cycles.

4. **The evolution chart**: facts and ideas for expressing changes in specific items from beginning data and its projections in to future.

5.**Strip tease chart**: it enables speaker to present the information step by

- It increases the interest and imagination of the audience.
- The information on the chart is covered with thin paper strips to which it has been applied either by wax, tape or sticky substance or pins.
- As the speaker wishes to visually reinforce a point with words or symbols, he removes the appropriate strip or paper. It produces interest. It increases learning and aids recall.

6**. Pull chart**: it consists of written messages which are hidden by strips of thick paper. The message can be shown to the viewer, one after another by pulling out the concealing strips.

7**. Flow chart**: diagrams used to show organizational elements or administrative or functional relationships. In this chart lines, rectangles, circles, are connected by lines showing the directional flow.

8. Tabulation chart: it shows the schedule of an activity or of an individual ex: time-table of a class. These are very valuable aid in the teaching situation where breakdown of a fact or a statement is to be listed. Also it is a useful aid for showing points of comparison, distinction, and contrasts between two or more things. While making the table charts the following points must be kept in the mind. The chart should be 50 X 75 cm or more in size.The chart should be captioned in bold letters. The vertical columns should be filled in short phrases rather than complete sentences.

9. **Flip chart**: a set of charts related to specific topic have been tagged together and hang on a supporting stand. The individual charts will carry a series of related materials or messages in sequence. The silent points of specific topic will be presented.

10. **Pie chart:** a circle will be drawn and divisions will be made into different sections, each section will be coded differently and code key will be given at right corner of the chart as legend. The circumference is divided into suitable sections. It is relevant for showing the component part.

5.4.3 GRAPHS

Graphs are the visual teaching aids for presenting statistical data and contrasting the trends or changes of certain attributes.

Method of preparation:

1. Before making the bar chart makes a rough sketch of it in a note book.
2. For drawing the bar graph use the chart paper of 50x 72 cm size.
3. Use two different color shades for the two contrasting groups.
4. The bars should be equi-spaced.
5. Write the key to the bar graph in a box on the right hand side corner of the chart paper.
6. Numbers specifying the magnitude of the bars should be on the top on the bars.

Types of Graphs

Pie graph: These are called as circle diagram. The data are presented thorough the sections of portions of a circle.

- In determining the circumference of a circle we have to take in to consideration a quantity known as pie.
- The surface area of a circle is to cover 360 degree.
- The total frequencies or value us equated to 360 degree and then the angles corresponding to component parts are calculated.
- After determining their angle, the required sectors in the circle are drawn.

Bar graph:

The graphic presentation extends the scale horizontally along the length of bars. Each bar must be of the same width, height of the bar over a period represents the corresponding time of the variable. Graphs are available in 2 forms that is vertical and horizontal.

Line graph:

To show the trends and relationships ex: single line shows the relation and the variation in the quantity. Quantitative data are plotted or when the data is continuous. The concepts are represented with the help of lines drawn either horizontally or vertically. The plotted points are connected to one another, instead of the base thus producing the curve.

Pictorial graph:

It is an out standing method of graphic representation. Pictures are used for the expression of ideal; they are more attractive and easily understood. Vivid pictures will be used to create rapid association with the graphic message; each visual symbol may be used to indicate quantity.

5.4.4 MAPS

A map is a graphic aid representing the proportionately as a diagram, the surface of the earth, world or parts there of. It conveys the message by lines, symbols, words and colors.

Types of maps:

Political maps: these maps show political divisions of the world, a continent, a nation.

Physical maps: shows the physical contour of a place, area, and region.

Relief maps: it shows the actual elevations and depressions in a place, area, and region.

Weather maps: shows the amount of rains, temperature extremes, humidity in an area, region country.

Population maps: shows the distribution of population in various parts of region, country.

Picture or tourist maps: shows historical spots monumental sites.etc.. Road maps: shows the roads of a region connecting various parts and points together.

Railway maps: shows the railway links between various points.

Air maps: shows the air routes between various points.

Sea root maps: *shows the sea routes between various sea ports.*

Importance of Visual Aids

Visuals (or pictures) are a great tool for seeing and understanding. Visual aids allow children the time they need to process what they are being asked to do. They do not disappear into thin air to be forgotten as spoken words or hand gestures do. Visuals can also be sequenced to breakdown and learn a skill bit by bit. Visuals remain the same and allow for identical rehearsal and consistent memory pathways to be created. With this rehearsal and memory of sequenced activities comes learning and understanding and ultimately increased confidence and self esteem. Visual aids should be used in conjunction with other forms of communication such as speech, signing and tactile experiences.

Advantages of Visual Aids

Visuals will help children who have difficulties with:

- listening and attending
- understanding and responding
- processing sequenced information
- motivation and play
- following instructions and routines
- anxiety and resistance to change
- social isolation and shyness
- challenging behaviour

5.4.5 GENERAL PRINCIPLES TO BE FOLLOWED IN THE USE OF AUDIO-VISUAL AIDS

1. There are three stages in a learning process when an educational aid is used to supplement the ordinary teaching. Viz.,
   i) preparing the pupils for the learning experience
   ii) reinforcing the values while the pupils are sharing the experience and
   iii) relating the experience with the lesson and thus stimulating further learning
2. The aids must be adopted to the intellectual maturity of the pupils and to the nature and extent of their previous experience.
3. There is no best aid which has all the advantages. Most visual aids suffer from some psychological limitations. The teacher should be familiar with the advantages and limitations of the various types of sensory aids.
4. Visual aids should not be considered as substitutes for oral and written methods of acquiring knowledge. They should be used to supplement the classroom teaching.
5. Visual instruction in the classroom should not be confused with entertainment. The effective use of an aid depends primarily on careful planning by the teacher.
6. In all cases, the time and effort on the use of a particular aid in preference to others must always be justified.

5.4.6 QUALITIES OF GOOD AUDIO-VISUAL AIDS

1. Audio-Visual Aids help in achieving the teaching objectives.
2. Audio-Visual Aids are beautiful and attractive but at the same time they are made in such a way that students should not be deviated from the lesson.
3. Audio-Visual Aids should neither be large nor so small. But it should be of the size that it can be seen by every student inside the class.
4. Audio-Visual Aids are very useful. Irrelevant material wastes the time and creates indiscipline in the class.
5. Audio-Visual Aids should arouse the curiosity of the pupils instead of their entertainment, otherwise pupils will divert towards entertainment only.
6. The pictures, maps or charts which are displayed before the pupils should not bear unnecessary informations. It decreases their influence.

7. The visual aids which are presented before the pupils should accompany the actions also. Such materials will provide some signals to the pupils and the teacher can also prove his desire successfully.

5.4.7 PLACE OF USING AUDIO-VISUAL AIDS

The following are the rules and principles which make us aware of the fact that when and how there Audio-Visual Aids should be used.

1. Audio-Visual Aids can be used in three phases of the lesson namely, introduction, presentation and Recapitulation.

In introduction, Audio-Visual Aids are used to create interest in the pupils for their lessons. In presentation, Audio-Visual Aids are used to make the minute and difficult facts and ideas of the lesson more precise while in Recapitulation, these are used to evaluate the lesson.

2. Audio-Visual Aids should be used only to clarify the minute and different ideas of the lesson.
3. While using Audio-Visual Aids, the teacher should remember whether a desirable impression can be left on the pupils by clarifying the ideas of the lesson in simple, interesting and entertaining way.
4. Before presenting the Audio-Visual Aids, necessary background should be prepared. It saves the time and the pupils understand the necessary things quickly.
5. Audio-Visual Aids should be used only when the need arises. When it is used excessively, it looks like a juggler's show. In such a situation teaching flops. The trainee teachers should remember that the success of teaching does not depend on the plenty of material, but depends on its proper use.
6. Audio-Visual Aids should not be presented before the pupils merely for an bird's eye view only. It causes no benefit to the pupils. Hence the teacher should present the material for so much time that the pupils may have sufficient time for its observation and thinking.
7. Some questions must be asked about the displayed material. This simplifies and clarifies the sense of the lesson.
8. The repeated use of one type of aid creates boredom amongst the pupils. Hence, there should be variety.

9. Audio-Visual Aids should be shown by placing it on the table or by hanging on the wall. Some trainee teachers show the aids by holding them in their hands, which is not correct. This restricts the movement of the teacher.
10. After using Audio-visual aids, the teacher should come immediately on his lesson. Its reason is that the teacher's main aim is only the development of the lesson, not showing the material.
11. Audio- Visual Aids should be immediately removed after their presentation. Otherwise they will deviate from their lesson. Therefore, after displaying a picture chart, it should either be placed at some safer place or it should be reversed on the wall.
12. Audio-Visual Aids are means to achieve the teaching objectives, not the ends.

5.4.8 ADVANTAGES OF USING AUDIO-VISUAL AIDS

The following are the general advantages of using Audio-Visual Aids:

1. By using Audio-Visual Aids, inaccessible processes, materials, events, objects, changes in time, speed and space could easily be brought to the class.
2. Use of Audio-Visual Aids results in greater acquisition of knowledge of facts and ensures longer retention of the information gained.
3. Use of Audio-Visual Aids in the classroom can provide effective substitutes for direct contact of students with the environment social and physical.
4. By using suitable Audio-Visual Aids, any expected change in attitude and behaviour could be facilitated.
5. Proper Audio-Visual Aids can provide integrated experiences varying from abstract to concrete.
6. Proper Audio-Visual the approach is through more than one sense multi-sensory approach and hence they will be able to secure and retain the attention of pupils as well as develop the communication skills of pupils.
7. Audio-Visual Aids could be used to motivate and stimulate interest of pupils to gain further knowledge.
8. Audio-Visual Aids could be used to advantages for any age or ability groups.

5.4.9 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

4. For presenting materials symbolically ---------- is used
5. The individual charts will carry a series of related materials or messages in sequence is called---------
6. Diagrams used to show organizational elements or administrative or functional
7. Relationships is called----------
8. Material which consists of written messages which are hidden by strips of thick paper is called----------

5.5 INTERACTIVE WHITEBOARD

An Interactive White Board is a touch-sensitive screen that works in conjunction with a computer and a projector. It is a presentation device that interfaces with a computer. The computer images are displayed on the board by a digital projector, where they can be seen and manipulated. Users can control software both from the computer and from the board. Participants can add notations, and emphasize by using a pen and or highlighter tool. By using his/her finger as a mouse, the teacher or student can run applications directly from the board. Another user at the computer can also have input. Any notes or drawings can then be saved or printed out and distributed to group members.

5.5.1 USE OF INTERACTIVE WHITEBOARD

Interactive WhiteBoards are an effective way to interact with digital content and multimedia in a multi-person learning environment. Learning activities with an interactive whiteboard may include, but are not limited to the following:

- Manipulating text and images
- Making notes in digital ink
- Saving notes for later review by using e-mail, the Web or print
- Viewing websites as a group
- Demonstrating or using software at the front of a room without being tied to a
- computer
- Creating digital lesson activities with templates, images and multimedia

- Writing notes over educational video clips
- Using presentation tools that are included with the white boarding software to
- enhance learning materials
- Showcasing student presentations.

5.5.2 INTERACTIVE WHITE BOARDS TO PROMOTE STUDENT LEARNING

In social Learning most people need to reinforce their beliefs and understandings by asking others questions, thereby making learning an inherently social activity. Current education theories are grounded in the notion of the social learner and position student engagement as a key component of knowledge construction**. First, Whole-class teaching** brings the entire class together, focuses their attention and provides structured, teacherfocused group interaction. **Second, Constructivism** relies on the learner to select and transform information, build hypotheses in order to make decisions and ultimately construct meaning. **Third, Active learning** learners actively engage in the learning process through reading, writing, discussion, analysis, synthesis and evaluation, rather than passively absorbing instruction (e.g., lecture model of instruction).

A common thread between these three learning theories is the understanding that student engagement is crucial to learning and, as a growing collection of international research proves, Interactive WhiteBoards promote student learning.

Educators can use digital resources while maintaining dynamic interaction with the entire class, provide computer-based learning without isolating students and encourage a higher level of student interaction in both teacher-directed and group-based exchanges. Interactive WhiteBoards promote interaction among the students, the learning materials and the teacher, and enrich ICT by providing a large work space for hands on work with multimedia resources.

Having a display surface large enough for everyone to see encourages a high level of student interaction. A teacher and a student can interact with the Interactive WhiteBoard at the front of the class and the rest of the students remain involved. As research indicates, the functionality of the Interactive WhiteBoard and its accompanying software allows for the development of classroom activities that are engaging for students, so they encourage greater focus, participation and interaction, and improve student learning outcomes as a result.

5.5.3 INTERACTIVE WHITEBOARD ACTIVITIES IN THE COMPUTER SCIENCE CLASSROOM

An Interactive WhiteBoard supports the teaching process of Computer languages in two main ways: it supports interaction and conversation in the classroom and it promotes the oral skills. A projection onto an Interactive Whiteboard is very different from a classic projectionof what is found on a computer screen. With an Interactive White Board the user is able to navigate from the board. He does not need to continually go back to the computer and, as a consequence, turn his back to the class. The teacher can spend his time concentrating on the learning process of the student instead of the technology. This is very important when using Interactive WhiteBoards to teach and is crucial in the computer language classroom. The Interactive WhiteBoard also facilitates navigation of the sitebecause it is finger driven on the board. This, too, facilitates classroom activities.

5.5.4 INTERACTIVE WHITEBOARD ACTIVITIES ACTIVITIES WHICH SUPPORT ORAL SKILLS

The introduction of the projector associated with the Interactive White Board brings the problem into a new perspective. When presented to the whole class, a web document can enhance oral interaction within the whole class. Opinions and ideas can be exchanged. It is possible to extend this operation of the Interactive WhiteBoard in order to let the student, instead of the teacher, navigate the board. The other students may guide him by giving directions in the target language. As suggested for group activities using the computer the Interactive WhiteBoard brings people together and encourages communication. It is also possible for students to present projects on the Interactive WhiteBoard. This enables them to speak without having to worry about the mouse.Pictures and text are shown without delay with the simple touch of a finger. This places the oral production in the target language in the foreground.

5.5.5 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

9. A touch-sensitive screen that works in conjunction with a computer and a projector is ----------
10. For Viewing websites as a group ---------- is useful
11. Active learning is possible by using ----------.
12. Pictures and text are shown without delay with the simple touch of a finger with the help of ---------

5.6 POWER POINT PRESENTATION

PowerPoint can be an effective tool to present material in the classroom and encourage student learning. PowerPoint can be used to project visuals which would otherwise be difficult to bring to class

5.6.1 DEFINITION

Microsoft Office product that provides users with an interface to design multimedia slides to be displayed on a projection system or personal computer. The software incorporates images, sounds, videos, text, and charts to create an interactive presentation. Microsoft PowerPoint interacts with other Office products such as Microsoft Word and Excel, and is included with most Microsoft Office packages.

PowerPoint is a complete presentation graphics package. It gives you everything you need to produce a professional-looking presentation. PowerPoint offers word processing, outlining, drawing, graphing, and presentation management tools- all designed to be easy to use and learn.

5.6.2 POWERPOINT FOR TEACHERS

Teachers can use PowerPoint in many applications in their classroom. Teacher have a choice for how much or how little they would like to apply this technology to their classrooms.

How teachers can use PowerPoint:

- Notes and Lessons
- Images
- Daily routines

- Classroom or student showcase
- Meeting agendas
- Videos and multimedia presentations
- Graphs and charts
- Audio

5.6.3 POWERPOINT FOR STUDENTS

PowerPoint can be used in the classroom in many ways. Students can learn how to use PowerPoint and apply their knowledge in many ways. When students learn PowerPoint they also gain valuable tech skills.

How students can use PowerPoint:

- Creative writing classes
- Visual interpretations
- Presenting information to the class
- Creating graphs
- Creating instructions
- Creating self quizzes
- Creating games
- Displaying student work
- Slideshows of class events and activities
- Problem Based Learning

5.6.4 STEPS IN CREATING AN EFFECTIVE POWERPOINT PRESENTATION

According to Penciner[these are the steps to an effective PowerPoint presentation:

1. Create three documents: speaker notes, a hand out and your slides. This will allow a presenter from putting too much information on a slide.
2. Use narration and relevant images.
3. Narration and images are better than narration and text.
4. Consider not to use bullets.
5. Limit the information on one slide.
6. Use interesting multimedia presentations but avoid excess.
7. Speak in a conversational manner.
8. Do not read slides.
9. Direct learners to important passages and events in your presentation.

5.6.5 DESIGNING THE POWERPOINT PRESENTATION

Preparing for the presentation

– Consider time and effort in preparing a PP presentation—give yourself plenty of lead time for design and development.

– PowerPoint is especially useful when providing course material online.

– Student technology compatibility with PowerPoint material put on the Web—ensure images and graphics have been compressed for access by computers using dial-up connection.

– Student accessibility—visually impaired may not be able to fully access a PowerPoint presentation, especially those with graphics and images.

– Copyrighted material—be sure to properly cite source material. This is especially important when using visuals obtained from the Internet or other sources.

– Message interpretation—will students be able understand material in a PowerPoint presentation outside of the classroom? Will you need to provide notes and other material to help students understand complex information, data, or graphics?

– If you will be using your own laptop, be sure the classroom is equipped with the proper cables, drivers, and other means to display your presentation the way you have intended.

Slide Content

Use PowerPoint to cue and guide the presentation rather than project long and complete sentences.

– Use the Notes Pages feature to add content to your presentation which the audience will not see.

– Relate PowerPoint material to course objectives to reinforce their purpose.

Number of slides

– As a rule of thumb, plan to show one slide per minute to account for discussion and time and for students to absorb the material.

– Reduce redundant or text heavy sentences or bullets to ensure a more professional appearance.

Emphasizing content

– Use italics, bold and color for emphasizing content.

– Use of a light background with dark typeface or a dark background (blue, purple, brown) with a light typeface is easy to read in a large room.

– Consider using different color slide backgrounds to change the pace of the presentation

– Avoid using underlines for emphasis which typically signifies hypertext in digital media.

Typeface

– Use a sans serif typeface such as Arial, Helvetica, or Tahoma.

– Limit the number of typeface styles to no more than two per slide.

Point size

– Ensure the typeface is large enough to read from anywhere in the room: titles and headings should be no less than 36-40 points.

– The subtext should be no less than 32 points.

Clip art and graphics

– Use clip art and graphics sparingly. Research shows that it's best to use graphics *only* when they support the content.

– Photographs can be effectively used to add realism.

– Size and place graphics appropriately on the slide – consider wrapping text around a graphic.

– Use two-dimensional pie and bar graphs rather than 3-D styles which can interfere with the intended message.

Animation and sound

– Add motion, sound, or music *only* when necessary. When in doubt, do without!

– Excessive movement within or between slides can interfere with the message and can be annoying. Avoid or use only simple screen transitions.

Final check

– Check for spelling, correct word usage, flow of material and overall appearance of the presentation.

– Colleagues can be especially helpful to check your presentation for accuracy and appeal. Note: Typos are more obvious when they are projected.

– Schedule at least one practice session to check for timing and flow.

– PowerPoint's *Slide Sorter View* is especially helpful to check slides for proper sequencing and information gaps and redundancy.

– Prepare for plan ―B in case you have trouble with the technology in the classroom – how will you provide material which is located on your flash drive or computer?

Handouts. PowerPoint slides can be printed in the form of handouts—with one, two, three, four, six, or nine slides on a page—that can be given to the students for reference during and after the presentation. The three-slides-per-page handout includes lined space to assist in note-taking.

– **Notes Pages.** Detailed notes can be printed and used during the presentation or, if they are notes intended for students, they can be distributed before the presentation.

– **Outline View.** PowerPoint presentations can be printed as an outline which provides all of the text from each slide. Outlines provide a welcome alternative to slide handouts and can be modified from the original presentation to provide more or less information than the projected presentation.

The Presentation

– PowerPoint should provide key words, concepts, and images to enhance your presentation (but PowerPoint should not replace you as the presenter).

– Avoid reading from the slide—reading the material can be perceived as though you don't know the material. If you must read the material, provide it in a handout instead of a projected PowerPoint slide.

– Avoid rapidly moving the laser pointer across the slide. Also, use a laser pointer with a dot large enough to be seen from all areas of the room.

– Allow no more than one to two slides per minute of content.

– Incorporate blank slides to allow students to reflect on what has just been discussed or to gain their attention .

– Stand to one side of the screen and face the audience while presenting.

– Leave classroom lights on and turn off lights directly over the projection screen if possible.

– Learn to use PowerPoint efficiently and have a back-up plan in case of technical failure.

– Give yourself enough time to finish the presentation. Trying to rush through slides can give the impression of an unorganized presentation and may be difficult for student to follow.

5.6.6. ENHANCING TEACHING AND LEARNING WITH POWER POINT

Class Preparation

PowerPoint can be used to prepare lectures and presentations by helping instructors refine their material to salient points and content. Class lectures can be typed in outline format which can then be refined as slides. Lecture notes can be

printed as notes pages and can also be given as handouts to accompany the presentation

Student's Learning Preferences

Using PowerPoint can address students' learning preferences through the projection of: color, images, video and shapes for visual learners; sound and music for auditory learners; and interactive slides which ask students to do something for kinesthetic learners which involve group or class activities where students can practice or review concepts .

Type-on Live Slides

PowerPoint allows users to type directly during the slide show which provides another form of interaction. These write-on slides can be used to project students' comments and ideas for the entire class to see. When the presentation is over, the new material can be saved to the original file and posted electronically

Just-In-Time Course Material

You can make your PowerPoint slides and notes pages available online 24/7 through Blackboard and other Web sites. Students can review the material before class, bring printouts to class and be better prepared for listening rather than taking a lot of notes during the class period.

5.6.7 ENGAGING STUDENTS WITH POWERPOINT

Running Slide Show as Students Arrive in the Classroom

This technique provides visual interest and can also have a series of questions students can answer as they sit waiting for the class to begin. These questions could be future texts or quizzes.

– **Opening Question**—project an opening question—Take a moment to reflect on _____.

– **Think-Pair-Share**—can be projected at different intervals of a presentation to allow students to concentrate on, and discuss with a partner, what has been presented.

o Think of what you know about _____.

o Turn to a partner and share your knowledge about _____.

o Share with the class what you have discussed with your partner.

– **Focused Listing**—list as many characteristics of _____ or write down as many words related to _____(this technique helps with recall of pertinent information).

– **Brainstorm**—what do you know about _____? Start with your clearest thoughts and then move on to those what are kind of ―out there (this technique stretches the mind, promotes deep thinking and recall of prior knowledge).

– **Questions**—ask students if they have any questions so far—do this about every 15 minutes or so. (This technique provides time for students to reflect and is also a good time for a scheduled break and for the instructor to interact with students).

– **Note Check**—take a few minutes to compare notes with a partner—to summarize the most important information—identify and clarify any sticking points.

– **Questions and Answer Pairs**—take a minute to come with one question then see if you can stump your partner!

– **Two-Minute Paper**—summarize the most important points of today's lecture—submit the paper at the end of class. (This technique allows the instructor to check the class progress).

– **If You Could Ask One Last Question—What Would it be?** (This technique allows for students to think more deeply about the topic and to apply what they have learned in a question format).

– **Classroom Opinion Poll**—do you believe in _____ or what are your thoughts on _____ (This technique provides a sense of where students are on certain topics).

– **Muddiest Point**—what is the muddiest point of today's material? (This technique allows anonymous feedback to inform the instructor if changes and or additions need to be made to the class).

– **Most Useful Point**—what is the most useful point in today's material and how can you illustrate its use in a practical setting? (This technique can tell the instructor if the course is on track).

5.6.8 MERITS OF POWER POINT

– PowerPoint saves time and energy once the presentation has been created, is easy to update and can be modified for other courses.

– PowerPoint is portable and can be easily shared with students and colleagues.

– PowerPoint supports multimedia such as video, audio, images and animation.

5.6.9 DEMRITS OF POWERPOINT

– PowerPoint can reduce the opportunity for classroom interaction (by being the primary method of information dissemination).

– PowerPoint can lead to information overload, especially with long sentences and paragraphs.

– PowerPoint can ―drive the instruction and minimize the opportunity for spontaneity and creative teaching.

5.6.10 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

13. ----------can be used to project visuals which would otherwise be difficult to bring to class

14. When students learn PowerPoint they also gain valuable -------- skills.

15. PowerPoint slides can be printed in the form of ----

5.7 LET US SUM UP

Instructional aids are educational aids and are not intended to amuse the pupil. On the other hand, they serve to inspire in them an interest and a desire to learn. Pupils of varying degrees of intelligence will all be equally drawn to Instructional aids.

With the growth of Science and Technology and with the additional importance being attached to its teaching, the use of Instructional aids is unavoidable. Today it has been proved beyond doubt by research and classroom experience that Instructional can contribute more for effective teaching as well as learning. A good Computer Science teacher like you can make a difficult concept so clear and easy, to a below average pupil in your class easily with the help of Instructional aids .

5.8 .UNIT END ACTIVITY

1. What are the advantages of visual aids?
2. Describe the uses of any three Visual aids
3. Describe the importance and use of Interactive White Boards for Teaching Computer Science

4. How will you use the Power point slides for Student interaction in teaching?

5. How will you design power point slide for teaching Computer Science?

6. What are the advantages of Visual aids?

7. How will you use power point slides for effective teaching?

5.9 ANSWERS TO CHECK YOUR PROGRESS

1.the eyes and ears

1.The eyes and Ears

2.Audio-Visual Aids

3. Audio-Visual Aids

4.Chart

5.Flip Chart

6. Flow Chart

7.Pull Chart

8.Chain Chart

9.Interactive White Board

10. Interactive White Board

11. Interactive White Board

12. Interactive White Board

13.Power Point Slides

14.Presentation

15.Hand Outs

5.10. SUGGESTED READINGS

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VI LATEST TRENDS IN INFORMATION TECHNOLOGY

Structure

6.1 INTRODUCTION

Multimedia and networking technologies have significantly impacted on our daily activities, particularly in terms of how we learn. E-learning technologies have made it possible to provide a virtual classroom environment on the Web through supporting teacher-student and student-student communications, course material distribution as well as online student assessments. They provide students with more control over their learning schedule and pace. On top of this, multimedia technologies further offer students different forms of media to match their learning styles, leading to enhancements of their learning effectiveness.*The Information Technology is revolutionizing the way, in which we live and work. It is changing all aspects of our life and lifestyle. Technology has become an essential part of education at all levels.. Multimedia approach is one such innovation that is aimed at improving the teaching learning process. This unit deals with the* Latest Trends in Information Technology: Multi media, desk top Publishing,Internet and its uses,E-learning,Virtual Learning,Web enabled/based learning,Tele conferencing and Video conferencing.

6.2 OBJECTIVES

After Studying this unit, you will be able to

1. Understand the Importance of Multi Media for Teaching
2. Explain the Use of Multi Media
3. Understand the applications of Internet
4. Explain the Meaning of E-Learning
5. Understand the characteristics of E-Learning
6. Explain the Modes of E-Learning
7. Illustrate the E-Learning Tools
8. Explain the concept of Virtual Learning
9. Understand the procedure of Web based Learning
10. Explain the types of Tele conferencing
11. Understand the concept of Video Conferencing

6.3 MULTIMEDIA.

The term multimedia by definition means 'more than one media'. According to Hofstetter (2001),multimedia is the use of computer to present and combine text, graphics, audio and video with links and tools that let the user navigate, interact, create and communicate. In other words, multimedia is the combination of various digital media, into an integrated multi-sensory interactive application or presentation to convey information to an audience . Other than that, interactivity is also part of the elements that are required in order to complete interactive communication process through the use of multimedia.

6.3.1 NATURE OF MULTIMEDIA APPROACH

1. Multimedia approach uses a number of media, devices, techniques, in the teaching learning process.
2. Multimedia approach has come out of researches and experiments in educational technology that have been undertaken in order to improve the process of teaching learning.
3. Multimedia approach aims at providing meaningful learning experiences via a mix of media in order to achieve predetermined objectives.
4. The choice of the media has to be done carefully so that one does not hamper or reduce the effect of the other i.e. each media must complement the after.
5. The media have to used sequentially and judiciously. Only necessary ones are to be used.Then it would be possible to make optimum use of them in a most economical manner.
6. In multimedia approach, several media and techniques are used as powerful means of communication.

6.3.2 INTERACTIVE MULTIMEDIA COMPONENTS

Interactive multimedia is a tool which has had a great impact in the field of education.

This tool uses five elements and combines them into a single powerful tools.

The five media are –

i) Text ii) Animation iii) Video iv) Graphics v) Sound.

6.3.3 MULTIMEDIA IN TEACHING-LEARNING

- Multi-Media approach has unique importance in the educational system and social transactions. It has revolutionized the lives of people in the world. It has played an important role ininnovation and improvement in teaching methods,individualization of instruction and an effective learning system for a fairly large number of students.
- Multi-media approach in teaching and learning is psychologically sound.Variety and newness of the media motivate the students for learning both at the preparation and participation stages and promote learning. Students profit from recreational activities like pictures, charts, posters, models, stories and plays, accounts of travels and musical productions.
- Multi-media approach in teaching and learning is essential for the effective realization of learning objectives and also provides Learning environment in which students take active part in the learning process.
- Multi-media approach in teaching and learning is learner-centred in the sense that it can accommodate learner's needs and interests. The variety and flexibility of multi-media offer the opportunity to adopt any media combination for use in individualised instruction.
- Various types of media like computer, television, video cassettes, video discs
- etc, can be of great value in supplementing and enriching the class-room instruction.
- Media like audio cassettes and CD's enable the learners to receive any given information according to their own convenient time.

6.3.4 ROLE OF TEACHER IN MULTIMEDIA APPROACH

The teacher has to make a lot of modifications and adjustment if he has to adopt multimedia approach. His role would have a different connotation compared to the traditional role. He would have to make these changes.

i) The teacher has to adopt a number of methods and techniques, he cannot be satisfied with the lecture or the chalk talk method.

ii) The teacher has to be aware of the different available media and their availability the teacher should be physically competent to use and demonstrate the use of different media.

iii) The teacher should be skillful enough to make a judicious choice of media and be competent enough to mix them sequentially and in an orderly manner.

iv) The teacher's role is that of a facilitator or manager of activities. He has to lead his students for independent, individualized learning.

v) The teacher should provide experience such that the students can link practice and theory & integrate them.

6.3.5 EDUCATIONAL IMPLICATIONS OF MULTIMEDIA

1. Multimedia enables students to represent information using several different media. Hypermedia links allow students to organize information in meaningful ways.
2. Multimedia can take into account different learning styles. Some students learn by interpreting text, while others require more graphical or aural representations.
3. Multimedia allows for self-pacing and discovery, students can take the time they need and choose the path of learning making learning meaningful and pleasurable.
4. Multimedia helps in development of higher order thinking skills. Interactive multimedia encourages student for learning.
5. Multimedia provided the students the flexibility of anywhere, 'any time' learning.
6. Multimedia helps in developing group and interpersonal skills. Better communication between students via e-mail, chat sessions etc., can encourage collaborative learning and enhance student-teacher interaction.
7. Multimedia helps students to learn the content in a given discipline. It helps students to think effectively, practice problem solving and decision making.
8. Multimedia helps students to construct knowledge actively, work in group and use multi-senses at a time. Multimedia is very effective and advanced approach in higher education.

6.3.6 BENEFITS OF MULTIMEDIA IN THE CLASSROOM FOR LEARNING

The simplicity and power of multimedia enriches teacher's creativity and leads to multi-sensory students learning. It is also a whole lot of fun! For qualitative improvement in Teacher Education in teaching learning process, Multimedia can prove as a big breather as it is capable of sustaining the interest of the learners, through visuals and audio inputs. It also brings in the elements of the outer world into the classroom. It can help learners in understanding the complex concepts in a very

simple way. Today more emphasis is laid upon the experience rather than rote learning.

6.3.7 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

1. The term multimedia by definition means
2. Multimedia approach aims at providing meaningful learning experiences through ------ in order to achieve predetermined objectives.
3. The simplicity and power of multimedia enriches teacher's creativity and leads to -------- students learning.
4. Multimedia allows for self-pacing and ----------
5. Multi-media approach in teaching and learning is ----------

6.4 DESKTOP PUBLISHING

Desktop publishing is the process of preparing documents for printing via special page layout software known as desktop publishing software. But actually, there is a bit more to the term than that.

The term entered the vocabulary of computer users in the late eighties after the development of one of the first desktop publishing applications — Aldus PageMaker. Until recent years, desktop publishing software typically denoted the top of the line professional programs used mostly by graphic designers to transform their ideas into the visual representation of a document meant for printing.

The introduction of desktop publishing presented marketing with a lot of scope and brought FYI enthusiasts and small businesses the means to take business promotion into their own hands without too much of a struggle. Perhaps this is why the term "desktop publishing" holds a slightly different meaning these days. Today desktop publishing encompasses any creative project meant for desktop and commercial printing *or* electronic distribution. This may include a greeting card to Grandma, a family scrapbook cover, or an electronic newsletter. In fact, desktop publishing today often refers to documents that are not at all meant for printing. This is due to developments in communication and promotion via the Internet.

This new paradigm has produced desktop publishing software that is specialized for a certain type of document (e.g. business cards or disc covers). Such software aims to simplify the user experience by eliminating tools unnecessary for that particular type of project. Though this has been the latest trend, there still exists a set of standard features for any type of desktop publishing software.

6.4.1 THE FEATURES OF DESK TOP PUBLISHING

Below is a list and description of the most basic and essential features that any desktop publishing software should have. Some of them may prove more crucial than others depending on the type of print project you are working with. Though these features are important, the list surely does not end here.

Support For Numerous Project

The ability to create a variety of projects defines the flexibility of a desktop publishing application. The key to delivering this is by supporting an abundance of paper layouts and the ability to create custom page layouts without too many restrictions.

Layout Tools

The term "layout tools" involves a range of tools that help to place and align objects accurately. Such tools include but are not limited to rulers, adjustable and automatic guides, multiple editing layers, object snapping, and object grouping. The guides and snapping options offer a point of reference when placing images and text in the document. Multiple editing layers keep the workspace more or less uncluttered which helps to prevent selecting and moving the unintended object. Object grouping helps in a similar way by making sure that multiple objects remain positioned proportionate to one another.

The integration of so-called "master pages" in a desktop publishing application saves you from having to create the same background multiple times for a multi-page document. This option creates a type of template that can be applied to every page of a document.

Text Tools

Desktop publishing software should offer a wide range of text editing tools extending beyond standard operations on text. Linked text boxes are an absolute must in desktop publishing. Such text boxes allow text to flow freely within a network of text boxes. This make editing text content much easier since the text boxes automatically adjust the contained text.

Adjusting the text properties of headers and other portions of text can be quite tedious. Applications with styles sheets make that process much quicker. One can think of style sheets as customizable text templates that can be applied to any portion of text by selecting it and choosing the corresponding style sheet. Other important text tools include circle text and artistic text effects.

Graphic Tools

The ability to edit images is also an absolute must for desktop publishing software. Ideally, an application should allow you to do more than just manipulate images (resize, angle, crop, or compress). It should give you a set of built-in image effects and filters as well as other functions related to design. Such functions may include adding shadows, controlling the transparency, and so forth. Highly professional applications may offer advanced drawing tools.

Printing and Sharing

Supporting a ton of paper layouts and printers is not enough to make a desktop publishing application great. If you are running an older printer, you will definitely need the ability print your project as a raster image since many old printers can not handle vector data. A person looking to send his document to the printshop will find that a variety of export options and the means to convert text to curves will turn out to be useful. Those who plan on printing any kind of booklet should look for an imposition functionality.

Desktop publishing has come quite a long way since its introduction in the 1980s. The process is basically the same but for a more broad range of results. The future will no doubt bring changes to both the process and result. This will probably bring about new tasks in the desktop publishing world, and hopefully, their solutions. For the moment, desktop publishing presents itself as a great solution for small business and even big business. It is as simple as identifying needs and areas where desktop publishing can provide a solution and finding the right software to help you get there.

6.4.2 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

5. One of the first desktop publishing applications is -------

6. A range of tools that help to place and align objects accurately is - --- ---

7. Desktop publishing was introduced in the year --------

6.5 INTERNET

The Internet has revolutionized the communication methods the world. Sitting at a workstation or a PC, one can get any kind of information one wants. The latest technological advances have enabled it to be used as a business tool as well, with the result that companies are today spending considerable amount of money on internet research. The amalgamation of Computer and Communication technologies has resulted in the integration of data, sound and video on the internet, which in turn has made it a powerful tool for reengineering business, processes the world over.

6.5.1 INTERNET AND ITS COMPONENTS

Definition of Internet

The Internet is a system that lets computers all over the world to communicate with each other. The internet is a network of networks that connects computers all over the world.

Origin of Internet

In 1960's the Advanced Research Project Agency (ARPA) of US Defense department funded a project to connect university computer scientists and engineers via their computers and telephone lines. This project called ARPANET, allowed researches to share each other's computer facilities over long distances. Email has been used by the user for their communication during the war time.

As more and more computers connected, the ARPANET was replaced by the NSFNET, which was run by National Science Foundation.

In late 1980's the barrier of NSFNET for using military and Research people has been broken away. By that it has reached public to use it.

In 1989, the WWW has emerged for information services and 1990's the combination of Email, the web and online chat boosted the use of Internet Service across National and International prominence.

Purpose of Internet

One can use the internet for the following purpose:

i. To exchange electronic mail with friends all over the globe for a small price.
ii. To participate in group discussions in topics of interest, through public news groups.
iii. To find educational tools, Universities around the world, books stores, and libraries are sharing online information.
iv. To shop-Commercial electronic store fronts are growing in number in USA and Europe. One can order different products over the Internet.
v. In the case of business one can get technical support for products one is using. One can publish information such as technical or marketing literature.
vi. Because the Internet is electronic, one can make changes to reflect late breaking news that would be impossible for printed publications. Change becomes easier, updates are simpler and information is instant.
vii. The Internet has become the first global venue for publishing information. This network has enough users now and it is benefiting from the positive feed back loop: the more users it gets, the more content it gets; and the more content it gets, the more users it gets.

The Components of the Internet are explained as follows:

Internet Service Provider (ISP)

An ISP is an organization that provides dial-in Internet account, usually a Point-to-Point Protocol (PPP) or a SLIP account.

To use a PPP account, the user need a PPP compatible program such as windows dialup networking program. This program dials the phone by using the modem, connects to the ISP, logs into the account with username and password, and connects to the ISP. Thus connecting the computer to Internet once Connected, the browser can be used to read the e-mail, browse the web and access other services of the internet. After completion of the browsing disconnect from the internet with the help of disconnect option in the dial-up networking. After connection establishment, the computer will be one among the billions of systems in the Internet.

Computer Address (IP)

Each host computer on the Internet has a unique number and it is called as Internet Protocol Address (IP Address). It is in the format of a.b.c.d, where the values of a, b, c and d will be in range of 0 to 255 and each one is called an octet. For example 192.168.32.251 is an IP Address of any host in the Internet.

A telephone number identifies a particular telephone. Similar is the IP Address. It identifies a particular Computer in the Internet. When a system is connected in the Internet an IP address is allocated dynamically by the ISP. By getting that IP Address, the host can communicate with each other system available in any part of the world.

Internet Protocols

A set of rules is called a Protocol. The most commonly used protocols are

i. Transmission Control Protocol / Internet Protocol (TCP / IP)
ii. File Transfer Protocol (FTP)
iii. Hyper Text Transfer Protocol (HTTP)

i. Transmission Control Protocol / Internet Protocol (TCP/ IP)

TCP / IP are actually a collection of protocols, or rules, that govern the way data travels from one machine to another across networks. The Internet is based on TCP /IP. TCP / IP have two major components: TCP and IP.

a. IP: The IP component does the following

i. Envelopes and addresses the data.
ii. Enables the network to read the envelope and forward the data to its destination.
iii. Defines how much data can fit in a single “envelope”.

b. TCP: The TCP component does the following

i. Breaks data up into packets that the network can handle efficiently.
ii. Verifies whether all the packets have arrived at their destination.
iii. “Reassembles” the data.

ii. File Transfer Protocol (FTP)

FTP or File Transfer Protocol is used to transfer files between computers on internet. These are two types of FTP connections, anonymous and not-anonymous. These are also two types of file transfer, ASCII and binary. ASCII is for text transfer only. Binary transfer are for transferring any thing else.

iii. Hyper Text Transfer Protocol (HTTP)

HTTP is the set of rules, or Protocol, that governs the transfer of hypertext between two or more computers. The World Wide Web encompasses the universe of information that is available via HTTP.

HTTP is based on the Client / Server principle. HTTP allows "Computer A" (the Client) to establish a connection with "Computer B" (the Server) and make a request. The server accepts the connection initiated by the client and sends back a response. A HTTP request identifies the resource that the client is interested in and tells the server what "action" to take on the resource. When a user selects a hypertext link, the client program on their computer uses HTTP to contact the server, identify a resource, and ask the server to respond with an action. The server accepts the request, and then uses HTTP to respond to or perform the action.

Telnet

Telnet is a service of the internet that allows to access remote computers outside the area. Many computers in the internet are set up to allow telnet access. Some requires login names and passwords but many do not have restrictions. Through telnet, we can access libraries, data bases and other public services all over the world.

Gopher

Gopher is a distributed information service, developed at the University of Minnesota that makes hierarchical collections of information available across the Internet. Gopher uses a simple protocol that allows a single Gopher client to access information from any accessible Gopher Server, providing the user with a single "Gopher Space" of information. Public domain versions of the client and server are also available.

Wide Area Information Service (WAIS)

WAIS is an Internet Search tool that is based on the Z39.50 standard. The Z39.50 standard describes a protocol, or set of rules, for computer-to-computer information retrieval.

WAIS also works on the client /server principle. A WAIS client program enables the user's computer to contact a WAIS server, submit a search query, and receive a response to the query.

WAIS has the capability of simultaneously searching in more than one database. After the search phrase has been typed into the client interface, the user can then choose which databases should be used to complete the search. Depending on the

WAIS client software being used, this may be a matter of using a mouse to select database names displayed on a screen, or of typing in the database names using the keyboard.

Uniform Resource Locator (URL)

A URL identifies a particular Internet resource; for example a web page, a Gopher server, a library catalog, an image, or a text file. URLs represent a standardized addressing scheme for Internet resources, and help the users to locate these resources by indicating exactly where they are. Every resource available via the World Wide Web has a unique URL.

URLs consist of letters, numbers and punctuation. The basic structure of a URL is hierarchical, and the hierarchy moves from left to right.

Protocol: // Server-name. Domain-name. Top-level-domain: port / directory /filename.

World Wide Web (WWW)

World Wide Web is also called the WEB, WWW and W3 is an interlink collection of hyper text documents residing on web servers and other documents, menus and databases, available via URLs. Web documents are marked formatting and linking with Hyper Text Markup Language (HTML) and web servers use hypertext transport protocol to deliver web pages. It is the multimedia experience on the Internet. The WWW consists of pages where we can find out just about anything we want or don't want to know about. The best place to start is to a search on one of the many search engines. Click on the net search button at the top of browser and follow instructions.

Internet Relay Chat (IRC)

IRC is a multi-user chat system that allows many people to communicate simultaneously across the Internet, in real time. IRC conversations take place on channels and a person can chat with other people by typing messages at the keyboard. IRC is where to meet people on the net. There is a channel for just about anything. First few words of warning after that IRC is a great place of visit. One can meet people from all over world and can talk about any subject.

News Groups

News groups are like an international bulletin board. Each group is a forum for a different subject, where the user can post questions and answers. There are many thousands of groups covering just about any area of interest. The user can just Internet

explorers or Netscape Navigator to view these groups. Any post that we make to a new group will be sent all over the world to every news server on the planet, so never post anything personal to newsgroup. Also, these are many newsgroups which may contain material that is not suitable for children.

Usenet

Usenet is the international meeting place where people gather to meet their friends, discuss the day's events, keep up with computer trends, or talk about what ever is one their mind. Jumping into a Usenet discussion can be a liberation experience. The basic building block of Usenet is the news group, which is a collection of messages with related theme. On other networks, these are called conferences, forums, bulletin boards, or special interest groups. Not all Internet hosts subscribe to Usenet and not all Usenet hosts are on the Internet. These are dozens of software packages used at various sites to transport and read Usenet articles.

Electronic Mail: (E-mail)

E-mail stands for Electronic mail. It is the most widely used tool to send and receive messages electronically on a network. It is the most widely used internet resources. Just as, a written letter can be sent to multiple recipients, on electronic mail, message can be sent to one or more e-mail addresses.

An E-mail address identifies a person and the Computer for purposes of exchanging electronic mail messages.

6.5.2 USES OF INTERNET

The key to success of Internet is the information. The better the quality, the more usage of Internet operations.

Large volume of Information: Internet can be used to collect information from around the world. This information could relate to education, medicine, literature, software, computers, business, entertainment, friendship and leisure. People can search for information by visiting the home page of various search engines such as Google, Yahoo, Bing, etc.

News and Journals: All the newspapers, magazines and journals of the world are available on the Internet. With the introduction of broadband and 3G services, the speed of internet service has increased tremendously. A person can get the latest news about the world in a matter of few minutes.

Electronic Mode of Communication: Internet has given the most exciting mode of communication to all. We can send an E-mail (the short form of Electronic Mailing System) to all the corners of the world.

Chatting: There are many chatting software that can be used to send and receive real-time messages over the internet. We can chat with our friend and relatives using any one of the chatting software.

Social Networking: People can connect with old friends on social networking sites. They can even chat with them when they are online. People are even concluding business deals over these social networking sites such as Facebook.

Online Banking (Net-Banking): The use of internet can also be seen in the field of banking transactions. Many banks such as HSBC, SBI, Axis Bank, Hdfc Bank, etc. offers online banking facilities to its customers. They can transfer funds from one account to another using the net-banking facility.

E-commerce: Internet is also used for carrying out business operations and that set of operations is known as Electronic Commerce (E-commerce). Flipkart is the largest e-commerce company in India. The rival, Amazon, is giving stiff competition to Flipkart.

Mobile commerce: Mobile commerce (also M-Commerce) refers to the commercial transaction that takes place over the mobile internet. Using the mobile internet technology, many companies have introduced mobile version of websites and mobile apps, to promote and sell their products. Customers can simply browse several through the products and buy online through mobile internet.

Mobile wallet: Many companies offer the service of mobile wallet to its customers. Users must have a smart-phone and internet connection to use this service. Users can pay an amount into their mobile wallet, which they can use to make online payment such as bill payments, recharges, etc.

Entertainment: Apart from a major source of knowledge and information, the utility of Internet in the field of entertainment cannot be undermined. We can visit various video sites and watch movies and serials at our convenient time.

Technology of the Future: Internet is the technology of future. In the times to come, offices would be managed at distant places through Internet.

Internet is very useful for everyone. It is the superhighway of information. The cost of Internet has been reduced over-time. The cost of the computer system, modem and other associated hardware is also likely to come down. In case computer system is

not available, one can browse internet over the mobile phones. All major smart-phones support browsing functionality.

6.5.3 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

9. WWW has emerged for information services in the year----------
10. The particular Internet resource is identified by----------
11. ------ is the international meeting place where people gather to meet their friends,
12. WAIS also works on the ---------- principle
13. HTTP is----------

6.6 E-LEARNING

Did you know that almost everyone who uses a computer has completed some type of e-learning? Perhaps it was called web-based training, or online learning, or computer-based training, but it's all under the same e-learning umbrella. E-learning can encompass a wide variety of online initiatives. So a good, broad way to think about e-learning is as the use of electronic media (computers, tablets, or phones) to educate or train learners.

6.6.1 DEFINITION OF E-LEARNING

E-learning is mostly associated with activities involving computers and interactive networks simultaneously. The computer does not need to be the central element of the activity or provide learning content. However, the computer and the network must hold a significant involvement in the learning activity.

Evolving E-Learning

The past decade has radically transformed e-learning. In the early days, e-learning courses were typically custom creations, coded by programmers and developers who used highly specialized tools and code to create these courses. In those days, it could easily require an entire team to create a simple, linear e-learning course. Very few people had the skills or knowledge to do so on their own.

Now, with advances in technology, creating e-learning is much more accessible. The course development tools have advanced to a point where just about anyone can create an e-learning course, without any programming or coding knowledge.

Changes in technology have also impacted the types of hardware tools we use. We've gone from using desktop computers exclusively to a mix of desktops, laptops, tablets, and smartphones. Naturally, e-learning has followed suit to span the array of devices we use. In fact, e-learning developed specifically for mobile devices, such as tablets and smartphones, is sometimes referred to as as "m-learning," or mobile learning.

The learner's experience of accessing e-learning has also evolved. It wasn't so long ago that learners had to first add custom applications and/or download players before they could view course content. This setup often took time and was fraught with challenges for the learner—even before the course started.

Then, in the late nineties, Adobe Flash became the standard for e-learning, which made it really simple to view and share e-learning content. For nearly a decade, a majority of browsers came with Flash, so learners could play courses through the Flash player in their browser. However, now that many mobile devices and tablets are not Flash compatible, many developers are shifting to HTML5 to publish and share e-learning courses.

6.6.2 VALUE OF E-LEARNING

E-learning offers a lot of value compared to more traditional training options, like facilitated sessions or lectures. E-learning ...

- **can be either an asynchronous or synchronous activity:** Traditionally, e-learning has been asynchronous, which means there is no predetermined time for the learning to take place. Everyone can go at their own pace, and take their time to learn what they need to know, when they need to know it. However, more synchronous e-learning is now being offered through web conferencing and chat options. The great thing about e-learning is it gives you the option to do one, or both.
- **has a global reach:** E-learning can simply be placed online and easily accessed by people around the world. There is no need for expensive travel or meetings across multiple time zones.

- **spans multiple devices/mobile:** Online courses can work on computers as well as on mobile devices, such as smartphones and tablets. This means e-learning courses can literally be in the hands of the people who need them, at all times.
- **is just-in-time/needs-based:** It's possible to create, publish, and share a course within a few hours. The software is so easy to use that almost anyone can create engaging courses.
- **reduces costs:** All of the above-mentioned factors result in a cost savings for organizations that use e-learning courses to replace some of their traditional instructor-led training.

As the world becomes more connected and globalized, more people have consistent access to the internet, computers, smartphones, and other technological devices. When we provide people with learning opportunities on these devices, they can use them to access timely resources and training while on the job.

The value of e-learning is that it can save time and money. It can often be more efficient to develop one course that can be distributed electronically and consistently to thousands, versus one that's delivered in person to training groups, where the message, equipment, and other conditions can vary enough to affect the outcome of the course.

6.6.3 COMMON E-LEARNING TERMS/TOOLS

There are countless tools, techniques, people, acronyms and resources associated with e-learning. Below we cover some of the ones we think you are likely to come across.

Tool / Term	Description
Virtual learning environment (VLE)	An online space provided by the institution to support e-learning. All forms of digital media can be delivered using its various tools. There is a wide range of VLEs on the market.
Personal learning environment (PLE)	A concept of understanding that individuals utilise a range of networks – combining both institutional and personal networks and devices to learn.
Blackboard	Example of a VLE that is commonly used in the UK.
Moodle	An Open Source VLE that is commonly used in the UK.
Podcast, either	A method of delivering multimedia content. The video podcasts are

video or audio	sometimes called vodcasts/vidcasts.
RSS	A method used to push and pull content across the Internet. Particularly useful for subscribing to a podcast http://web2practice.jiscinvolve.org/rss-2/
Face-to-face teaching	A method of delivering teaching and learning that is normally used to distinguish between the classroom teaching environment and online.
Learning object	An object such as an audio file. Courses are typically made of many learning objects
Blended learning	A method of delivering teaching and learning that involves both face-to-face teaching and the use of technology together at the same time. For example the internet may be used to support a session that includes interactive tasks for the learner.
Distance learning	Delivering teaching and learning remotely, typically using technology and the internet Multimedia resource are often incorporated to provide context to text-based resources.
Discussion forum	A communication tool for posting messages/work/comments/opinions. Often text-based but some do offer the ability to use multimedia.
Blog	A way of posting educational material online, normally organised by date and topic category. Images, video and audio can be shared in this manner. Blogs typically allow commenting, which can be a useful feature for teaching and learning.
Wiki	An editable tool for working with others that has a trackable history of changes (wikipedia is the most popular example). Much like a blog, its strength is that can be used to share multimedia resource.
Web 2.0	Essentially leveraging some of the more recent developments to support better interaction including social features. Many of these web 2.0 services provide community tools for sharing and commenting on resources, such as video.
Web service	A web delivered service that can be used for many types of activity including the storage and delivery of multimedia. Examples of web services include YouTube and web storage.
Netbook	A laptop that is very lightweight, portable and is often cheaper than most laptops. In order to achieve this, typically size and power are

	sacrificed. They can be used to create, use, manage and deliver multimedia.
e-book reader	Used to read digital e-books. Many of these readers can play audio books and/or read text out loud.
Flash player	A plug-in piece of software that adds functionality to the browser. Many e-learning resources have been created using Flash and most web videos at present use this technology.
Mobile learning (use of mobile phones and other handheld devices)	Using mobile devices including mobile phones to facilitate teaching and learning.
Open-source software	Software that is provided under a license that permits the user to have access to the source code. Open source software can be used to create, consume and delivery multimedia. An example is the audio editing tool 'audacity' which is very popular for creating and editing audio podcasts.
Creative Commons licensing	A way to share copyrighted work within a documented license scheme. Creative Commons licenses are increasingly applied to teaching resources that are typically made available using the internet.
HTML	The structural code that makes websites. Multimedia is typically delivered from websites that are built from HTML. Websites in turn allow us to produce e-learning for teaching and learning.
Scripts	Bits of code that add additional functionality to a website or service. Scripts can be created to support teaching and learning. For example, JavaScript is used to increase the functionality of the browser which can be used to create interactive based activity.
Web browser	A browser is a piece of software that allows us to interact with the web via a computer. Internet Explorer and Mozilla Firefox are two popular examples of web browsers that provide access to e-learning material and multimedia resources
Social media	Social media tools are used to communicate between people on the web and can be used to support teaching and learning. For example it is often desirable to use social media tools to facilitate online community opportunities including learner collaboration

6.6.4 SOFTWARE USED FOR CREATING E-LEARNING

In the early days of e-learning, only programmers and coders had the complex programming skills to create e-learning courses. Then came applications like Authorware, which still required programming, and Microsoft PowerPoint, which came into play in the late 1980s. PowerPoint quickly became the go-to tool for designing slide-based e-learning courses for much of the 1990s.

A huge leap forward for e-learning development occurred with the advent of PowerPoint-to-Flash tools. With that advancement, developers could convert PowerPoint courses, which were rarely interactive, to Flash, without needing to do any programming. Developers could also use form-based tools like Articulate Engage to push the creative envelope of their content beyond what they could do in PowerPoint.

The new millennium saw even more advancements as new tools were introduced. With these, the average layperson was better equipped to design and build their own e-learning courses. Today's e-learning authoring tools are typically broken down into two categories: form-based and free-form development.

Form-based authoring tools:

Using a form-based application means certain aspects of the e-learning course are prebuilt. You simply need to add in the proper text, images, and colors. With different combinations of these, you can vary the look of the interactions created from the same form.

Form-based tools are great for people who want to develop content quickly. They also work well for people who are less technical, or who are newer to e-learning and want less of a learning curve. Articulate Engage (part of the Articulate Studio suite) is a perfect example of a form-based tool. The application comes with 20 prebuilt interactions, from a bulletin board to a circle diagram to a pyramid interaction. All you do is use the form-based tool to add your own information.

Free-form authoring tools:

While form-based tools offer prebuilt key functionalities, free-form software does just the opposite. A free-form tool generally starts you out with a blank slide, and you then build the entire functionality and design for yourself. This gives you more options for customizing the look, and is better suited to someone who is comfortable with the technology. Free-form applications are often used to create highly customized, complex e-learning modules.

The trade-off with free-form authoring is that you have to make every little decision, which requires more planning. For example, say you wanted to create a tabs interaction. If you used the form-based tool in Engage, you'd be finished in minutes. If you wanted to use a free-form tool, you'd need more time to determine the screen layout, colors, interactive elements, and logic of how the tabs work.

In short, free-form gives you more power and more options, but it also requires more skill and time.

6.6.5 SHARING OF E-LEARNING

Once you've created an e-learning course, you need to distribute it to learners. There are many ways to do this, and—like everything else related to e-learning—those ways are constantly evolving and improving. Here, I'd like to look at two ways to share content: informal distribution and formal distribution.

Informal distribution

Informal distribution of e-learning content typically means users are trusted to view the e-learning course, and are not tracked or scored for completion. One way to informally share an e-learning course is to put it on a web server, then send participants the link and have them view the course. You don't really have a systematic way of knowing whether learners have completed the course, but sometimes that's not necessary.

Formal distribution

Sharing an e-learning course formally means there's a need to track and record learner results. Most organizations that have a need for formal distribution of e-learning have specific systems and standards in place for this.

Tracking is usually done in what is called a Learning Management System (LMS). Certain standards are in place to report the information to the LMS, including AICC, SCORM, and, more recently, Tin Can.

A Few Important Terms to Understand the Distribution of E-learning:

- **LMS:** LMS stands for Learning Management System and refers to software used to administer, track, report, and document the delivery of your e-learning courses.
- **SCORM:** A Shareable Content Object Reference Model is a collection of specifications and standards for e-learning, which allows communication between the e-learning content and the LMS. There are several versions of SCORM.

- **AICC:** The Aviation Industry Computer-Based Training Committee is a set of specifications designed so learning technology vendors can spread their costs across multiple markets.
- **Tin Can:** Tin Can API (Application Programming Interface) is a new specification for e-learning, which is not tied to an LMS and collects data about a person's learning experiences across various devices. These devices are able to communicate with each other using this new spec.

6.6.6 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

14. E-learning developed specifically for mobile devices called -------
15. A laptop that is very lightweight, portable and is often cheaper than most laptops is called ------
16. LMS stands for ----------
17. VLE stands for ----------
18. PLE stands for ----------

6.7 VIRTUAL LEARNING

Learning is one of the never ending processes. There is tremendous to learn everyday as there is the technology developing every day. Since it happens daily, one can say that it is pretty difficult for everyone to get directly in touch with all the updates. But there has also been the development made even for that. Yes, the answer is the virtual learning sessions happening in most of educational institutions. Here we can have a discussion in detail about the features and the advantages of the virtual leaning process.

The rapid development in information and communication technology (ICT) provides such as computers, interactive multimedia CD-ROMs, e-mail and internet. The use of such well advanced technologies has now enabled the learners of flexible learning to stimulate a virtual learning and take the learners to a virtual campus where teacher learner interaction becomes possible in the cyberspace. The World Wide Web technology is a vehicle for disseminating course materials and for creating active experiences within a classroom-based course.

6.7.1 DEFINITION OF VIRTUAL LEARNING

"A generic term to describe a broad range of ICT systems which are used to deliver and support learning. A learning platform usually combines several functions, such as organizing, mapping and delivering curriculum activities and the facility for learners and teachers to have a dialogue about the activity, all via ICT. "

virtual learning environment is a set of teaching and learning tools designed to enhance a student's learning experience by including computers and the Internet in the learning process.

A V**irtual learning environment** is a system designed to support teaching and learning in an educational setting. The main feature of the virtual learning process is that there will be learning from home option which makes the learning process more widespread than any other learning process. VLE has the potential to change the way we learn. The virtual learning process usually begins with the installation of the virtual learning software in your system. The internet serves as the medium for the virtual learning process. The internet helps the user to get connected with training room which is present at a remote connection. The virtual learning process has the presence of the teachers who are present at a distant location and also there is the video conferencing made to the students live on the teaching-learning process.

The students in the virtual learning rooms also have the feature to ask doubts to which the teacher is able to respond immediately. The process of virtual learning also has the books and other regular features. The exams are mostly conducted through online and the results of the virtual learning also are declared online.

The principal components of a VLE package include curriculum mapping to support breaking curriculum into sections that can be assigned and assessed; learner tracking; online support for both instructor and learner; and electronic communication tools such as email and Internet links to outside curriculum resources. Furthermore, a VLE is not only a well-structured information space but also includes the functional relationship between how information is structured and represented and how it can be used in learning activities and interaction.

A VLE will normally work over the Internet and provide a collection of tools such as those for assessment (particularly of types that can be marked automatically, such as multiple choice), communication, uploading of content, return of students' work, peer assessment, administration of student groups, collecting and organizing

student grades, questionnaires, tracking tools, etc. New features in these systems include wikis, blogs, RSS and 3D virtual learning spaces.

6.7.2 FEATURES OF VLEs

- **Synchronous Vs. asynchronous:** A lecture streamed through the online classroom live is a synchronous event. Video and audio that is pre-recorded is asynchronous and allows students to take in the material at different times. Synchronous events are often archived for students unable to participate at the time of the broadcast. With synchronous features, VLEs often provide a way for students to ask questions via a chat function.
- **Multimedia capabilities:** Depending on the VLE, instructors may include video and audio materials or set up video conferences with students. It's important to determisne whether video will be streaming, i.e. playing through your Internet connection, or if you'll need specific software with which to download and play the video. It's Learning allows students to record audio and video using the classroom interface.
- **Browser vs. application access:** You will be accessing the virtual classroom from any computer with an Internet connection (browser access) or will you need to download and install specific software on your personal computer
- **Mobile access:** Increasingly, VLEs are beginning to allow for access from PDAs and smart phones.
- **Document management:** Documents can be organized in different ways. Often the VLE has both shared and private, or permission based, areas for coursework and other materials. It includes a Webliography, dedicated area for sharing web links. Desire to Learn's Locker feature allows students to securely store their own documents and invite others to view selected items.
- **Discussion:** Threaded discussions are the backbone of VLEs. Instructors can now add features such as video and audio conferences and live chat to the interactive options.
- **Assignments:** Most VLEs have something called a drop box where students can upload finished assignments for review by the instructor.
- **Real time interaction:** e-College's Class Live feature combines a live chat with a whiteboard function, allowing the instructor to demonstrate information with graphs and slideshows. Live Room is a similar feature designed by

Desire2Learn that can incorporate PowerPoint files and allow participants to ask questions in real time.

- **Quizzes and tests:** Instructors can administer quizzes and tests with most VLEs. Once a student begins the test, most often a series questions with boxes in which to type answers, they are prevented from backing up or exiting the quiz page.

6.7.3 ADVANTAGES OF VIRTUAL LEARNING

The concept of virtual learning environment is becoming famous all around the world because of the following advantages.

1. VLE is often used in schools and other educational establishments in order to make the learning experience more interactive.
2. While originally created for distance education, VLEs are now most often used to supplement traditional face to face classroom activities, commonly known as Blended Learning.
3. These systems usually run on servers, to serve the course to students Multimedia and/or web pages.
4. Anyone can learn and the necessity to spend a whole lot of time is not required.
5. Learning is made flexible and adaptable to the comfort of the end user in the phenomenon of virtual learning.
6. Lot of time is saved and also there is updating of the knowledge with all the technology available. Thus one can conclude that the virtual learning process is really a boon to those whose passion is learning and knowing more.
7. One can surely enroll in any of the virtual learning short training sessions that are happening a lot more nowadays.
8. Students will begin to maximize their learning through customized and individualized learning.
9. With one-to-one computing, brought about by powerful, smaller and thinner devices (PDAs and Web pads), teachers will finally be able to offer meaningful, formative, ongoing assessment targeting individual needs.

6.7.4 DIFFERENT FORMS OF VIRTUAL LEARNING

- *Computer-Based:* Instruction is not provided by a teacher; instead, instruction is provided by software installed on a local computer or server. This software can frequently customize the material to suit the specific needs of each student.

- *Internet-Based:* This is similar to *computer-based* instruction, but in this case, the software that provides the instruction is delivered through the Web and stored on a remote server.
- *Remote Teacher Online:* Instruction is provided by a teacher, but that teacher is not physically present with the student. Instead, the teacher interacts with the student via the Internet, through such media as online video, online forums, e-mail and instant messaging.
- *Blended Learning:* This combines traditional face-to-face instruction, directed by a teacher, with *computer-based, Internet-based* or *remote teacher online* instruction. In effect, instruction comes from two sources: a traditional classroom teacher, and at least one of the forms of virtual learning described above.
- *Facilitated Virtual Learning:* This is *computer-based*, *Internet-based* or *remote teacher online* instruction that is supplemented by a human "facilitator." This facilitator does not direct the student's instruction, but rather assists the student's learning process by providing tutoring or additional supervision. The facilitator may be present with the learner or communicating remotely via the Web or other forms of electronic communication.

Similar forms of virtual learning are sometimes grouped into broader categories:

- *Online Learning*: This is any form of instruction that takes place over the Internet. It includes *Internet-based* instruction; *remote teacher online* instruction; and *blended learning* and *facilitated virtual learning* that involves these two virtual learning methods. It excludes *computer-based* learning.

Full-Time Online: This is online learning with no regular face-to-face instruction or facilitation. It is *Internet-based* and *remote teacher online* learning only, though it may include some occasional interaction with human teachers and facilitators.

6.7.5 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

19. The dedicated area for sharing web links is called-----

20. A lecture streamed through the online classroom live is a -------

21. Any form of instruction that takes place over the Internet is----

6.8. WEB-BASED LEARNING

6.8.1 DEFINITION OF WEB-BASED LEARNING

Web-based learning encompasses all educational interventions that make use of the internet (or a local intranet). There are currently three broad classifications or configurations within WBL: tutorials, online discussion groups, and virtual patients.

Online tutorials are similar to face-to-face lectures. They generally consist of information structured by the teacher in a way that will (hopefully) facilitate learning. Tutorials are often enhanced by features such as multimedia (sound, pictures, movies, and animations), links to online resources (full-text journal articles or related websites) and other areas within the course, and self-assessment tools. Effective online tutorials often also make use of patient cases. Online discussion is similar to the face-to-face small group session.

6.8.2 ADVANTAGES OF WEB-BASED LEARNING

Perhaps the most obvious advantage of WBL is that it overcomes physical distances. This is the cardinal feature separating WBL from other computer-assisted instructional methods, and enables WBL to facilitate the teaching of students scattered across different practice sites in the same city, different cities, and even different countries.. The result of distance independence is that learners have the opportunity to participate in the same instructional activities regardless of physical location.

Flexible scheduling

Along with flexibility in physical location, WBL offers flexibility in timing of participation. In contrast to lectures given at a fixed time, learners can access a WBL tutorial. Participating in an asynchronous online discussion group also offers flexibility, but it is tempered by the need to respond to communications from other group members in a timely manner and adhere to agreed schedules. *Easily updated perpetual resource.*

Changes in medical practice and feedback from students often prompt teachers to update or alter their course. With WBL, such changes can be made quickly and easily, and avoid the expense of reprinting the course syllabus. Other faculty, and even students, can also be involved in the process of updating the course. Web-based learning products persist long after the course ends.

Individualised learning

Web-based learning offers the promise of individualized learning. Learners can be given greater control over the learning environment by allowing them to select from among multiple different learning opportunities within a given course and move at their own pace. Learners struggling to learn a topic can pursue remedial work, those interested in learning more can do so, and those already familiar with the topic can move quickly to the next. Likewise, asynchronous communication in an online discussion group allows learners to tailor participation to their needs; those desiring or requiring more time for study and reflection can use it.

Another way to individualise instruction involves adaptive instruction in which the computer uses information about the learner to alter and thus optimise the learning experience. Adaptation has been suggested in response to various individual differences including baseline knowledge of the subject matter, motivation, attitudes toward computers, and learning and cognitive styles.

Novel instructional methods

Web-based learning facilitates several instructional methods that would be infeasible or at least difficult in traditional settings. . This provides the opportunity to 'experience' uncommon scenarios, facilitates the repetition (deliberate practice) and temporal spacing (distributed practice) required for enduring learning, and allows communication of detailed performance-based feedback. Other learning exercises, such as interactive models and games, or using the internet to search for and assimilate information from multiple sources, can engage learners. Multimedia (colour, sound, video, photographs, graphics, and animations) can enrich a course in ways that would be difficult, if not impossible, using a textbook. The asynchronous nature of many online discussion groups allows time to think deeply about the issues at hand and spend time constructing a thoughtful response. This is in contrast to a face-to-face setting where the conversation may move on before a learner has had time to grasp the concepts let alone formulate a question or comment.

Assessment and documentation

Finally, WBL facilitates assessment and documentation of educational objectives. Online assessment has the same flexibility in distance and timing as the WBL intervention, and also allows immediate customised feedback. Furthermore, in an age when documentation of learning tasks and competence is increasingly expected, WBL can serve a useful administrative purpose.

Automated record-keeping can verify exactly what content.

6.8.3 DISADVANTAGES OF WEB-BASED LEARNING

Social isolation

Flexibility in time and location means that the learner using WBL tutorials and virtual patients is often studying alone, which over time may lead to a percept on of social isolation. Online discussion groups have a distinct social organisation which differs to that of a face-to-face small group. In an era when teamwork and team learning is increasingly valued, will WBL build or detract from critical interpersonal relationships and communication skills?

De-individualised instruction

Despite the promise of individualised instruction noted above, it has yet to be clearly shown that these theoretical promises bear fruit as hoped. On the contrary, more often WBL fails to respond to the individual needs of the learner. Whereas a good teacher can monitor the group and adapt instruction to accommodate various learning needs, adaptive WBL interventions must be explicitly programmed to monitor, recognise, and respond appropriately to individual needs.

Cost

Offsetting the potential economies of scale are the large up-front costs associated with developing WBL. While it is a simple matter to convert an existing textbook, syllabus, or lecture to a web-based format, such conversions rarely if ever constitute effective instruction. In contrast, the development of an effective online tutorial or virtual tutoring can be very expensive

Technical problems

Despite best intentions, technical problems are inevitable with virtually all instructional media (for example, running out of chalk when teaching with a blackboard). However, as instructional media become more dependent upon technology the impact of technical problems becomes greater. In the absence of chalk a good teacher could improvise and teach, but serious computer problems will completely disrupt a WBL course.

Poor instructional design

The quality of instructional design varies in all teaching settings. However, in WBL this is more obvious because once complete a website can be viewed and critiqued by all users. Furthermore, in contrast to a face-to-face course in which a

talented instructor can teach with minimal preparation, instruction in WBL must be explicitly planned and implemented. WBL more sensitive to flawed designs.

Technology for technology's sake

Perhaps not so much a disadvantage as a potential error, many educators and administrators are seeking out WBL and other education technologies for the sake of technology, rather than to achieve an educational goal. It is as though the technology train is leaving the station and no one wants to be left behind. Unfortunately, this has often led to poor instructional design (as noted above) or, worse yet, the use of WBL in situations in which other instructional methods or media would be more effective.

6.8.4 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

22. Web-based learning is based on --------
23. WBL facilitates assessment and documentation of ---------
24. Web-based learning offers the promise of -------
25. WBL offers ------ in timing of participation.

6.9 TELECONFERENCING

6.9.1 MEANING Of TELECONFERENCING

The term teleconferencing refers to electronic meetings that involve people who are at physically different sites.

Telecommunication technology system allows meeting participants to interact with one another without travelling to the same location.Teleconferencing is an important form of electronic meeting systems. Sessions are held in real time, with major participants being televised while participants at remote sites usually take part with voice input of questions and responses. Teleconferencing can also consist of using closed-circuit television to reach large groups at multiple sites. Several major communication carriers and hotel chains now offer teleconferencing services for such events as sales meetings, new product announcements, and employee education and training. Three different types of teleconferencing exist: audio teleconferencing, video teleconferencing and computer conferencing.

6.9.2 AUDIO CONFERENCING

Audio conferencing is the use of voice communication equipments to establish an audio link between geographically dispersed persons, one that allows them to conduct a conference. The conference call was the first form of audit conferencing and is still in use. Some firms install more elaborate systems consisting of private, high-quality audio communications circuits that can be activated with the flip of a switch. Audio conferencing does not require a computer. It only requires a two-way audio communications facility. Audio conferencing is best suited for firms that are spread over a wide area. However, since it is a form of synchronous communication that requires all participants to be present at the same time, it is difficult to schedule conferences when time zones are far apart.

6.9.3 VIDEO CONFERENCING

Video conferencing is the use of television equipment to link geographically dispersed conference participants. The equipment provides both sound and picture. Like audio conferencing, video conferencing also does not necessarily require a computer.With video conferencing, participants can see and hear each other. Generally, participants gather in relatively expensive, specially equipped rooms that can handle the complexities of simultaneous video and audio transmission. There are three possible video conferencing configurations.

One-Way Video and Audio: Video and audio signals are sent from a single transmitting site to one or more receiving sites. This is a good way for a project leader to disseminate information to team members at remote locations.

One-Way Video and Two-Way Audio: People at the receiving sites can talk to people at the transmitting site, while everyone views the same video images.

Two-Way Video and Audio: The video and audio communications between all sites are two-way. Although this is the most effective of the electronically aided conferencing approaches, it can be the most expensive as well.

6.9.4 COMPUTER CONFERENCING

A third form of electronic conferencing is computer conferencing. There is a fine line between this system and Email. Both use the same software and hardware. Two factors determine this application, who uses the system, and the subject matter. E-mail is available to any one who has access to the network and that includes practically everyone in the office. Also, the E-mail system can be used for any purpose. Computer conferencing, on the other hand, is the use of a networked

computer that allows particular task. Computer conferencing is more disciplined form of E-mail. Unlike an audio conference, a, computer conference group can consist of large number of participants. One of the largest computer conferences was formed within IBM to include anyone who had an interest in the IBM PC. Its members exceeded 40,000, and there were over 4,000 separate topic areas. Computer conferencing differs from audio and video conferencing because it can be used within a single geographic site. A person can use computer conferencing to communicate with someone in the office next door.

6.9.5 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit

26. The electronic meetings that involve people who are at physically different sites is called ------
27. The use of voice communication equipments to establish an audio link between geographically dispersed persons is called ----
28. The use of television equipment to link geographically dispersed participants is called----------

6.10 LET US SUM UP

Technology provides numerous tools that teachers can use in and out of the classroom to enhance student learning. Technology can support student collaboration on creating new knowledge, reflecting on what they are learning, or working together to achieve a deeper understanding of course material. Educational technology includes numerous types of media that deliver text, audio, images, animation, and streaming video, and includes technology applications and processes such as audio or video tape, satellite TV, CD-ROM, and computer-based learning, as well as local intranet/extranet and web-based learning. Information and communication systems, whether free-standing or based on either local networks or the Internet in networked learning, underlie many e-learning processes.

Theoretical perspectives and scientific testing influence instructional design. The application of theories of human behavior to educational technology derives input from instructional theory, learning theory, educational psychology, media psychology and human performance technology.

Educational technology and e-learning can occur in or out of the classroom. It can be self-paced, asynchronous learning or may be instructor-led, synchronous learning. It is suited to distance learning and in conjunction with face-to-face teaching, which is termed blended learning. Educational technology is used by learners and educators in homes, schools ,businesses, and other settings.

6.11 UNIT- END ACTIVITIES

1. Explain the Use of Multi Media in teaching
2. Describe the features of Desk Top Publishing
3. Describe the components of Internet
4. What are the uses of Internet?
5. Describe the characteristics of E-learning
6. List Out E-Learning Tools\7.
7. Describe the different modes of e-learning
8. What are the features of Virtual learning?
9. Describe the different forms of Virtual Learnig?
10. What are the advantages of E-learning?
11. What are the advantages of Web based lea\rning?
12. Decrive the role of teleconferencing in Education?

6.12 ANSWERS TO CHECK YOUR PROGRESS

1. More than one media
2. Mix media
3. Mult-Sensory
4. Discovery
5. Learner-Centred
6. Aldus Page Maker
7. Layout Tools
8. 1980
9. 1989
10. URL
11. USENET
12. Client/Server
15. Netbook
16. LME
17. VLE
18. Learning Management Environment
19. Webliography
20. Synchronoous Communication
21. On-Line Learning
22. Internet
23. Educational Objectives
24. Individualised Learning
25. Flexibility
26. Teleconferencing

13.Hyper Text Transfer Protocol	27.audio Conferencing
14.Mobile Learning	28Video Conferencing

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VII EVALUATION IN COMPUTER SCIENCE

Structure

7.1 INTRODUCTION

Evaluation is the structured interpretation and giving of meaning to predicted or actual impacts of proposals or results. It looks at original objectives, and at what is either predicted or what was accomplished and how it was accomplished.

In this unit, we are going to deal with the concept of evaluation, tools and techniques in evaluation, Formative and summative evaluation, Grading pattern, Computer Aided Evaluation,On line examination and E-assessment.

7.2 OBJECTIVES

After studying this unit, you will be able to

1. Understand the Concept of Evaluation
2. Understand Objective Based Evaluation
3. Indentify the tools of evaluation
4 Understand the procedure of Constructing Diagnostic and Achievement tests
5. Understand the Formative and summative Evaluation
6. Understand Comprehensive Evaluation and Grading Pattern
7. Understand the Concept of Computer Aided Evaluation
8. Understand the procedure of On-Line examination
9. Understand the meaning of e-assessment and types.

7.3 EVALUATION: CONCEPT AND IMPORTANCE

Evaluation in general is an act or a process that allows one to make a judgement about the desirability or value of a measure. Evaluation in educational situation is thus a relatively new term introduced to designate a more comprehensive concept of measurement than is implied in conventional tests and examinations. The emphasis in evaluation being upon broad personality changes and major objectives of an educational programme and therefore include not only subject matter achievements, but also attitudes, ideals, ways of thinking, work habits and personal and social adaptability. Thus evaluation is not just a testing programme. Tests are but one of the many different techniques that may contribute to the total evaluation programme. Evaluation is any systematic continuous process of determining:

i) The extent to which specified educational objectives, previously identified and defined are attained.

ii) The effectiveness of the learning experiences provided in the classroom.

iii) How well the goals of education have been accomplished.

Thus evaluation is integrated with the whole task of education and its purpose is to improve instruction and not merely to measure its achievements. It exercises a great influence on the pupils' study habits, the teacher's methods of instruction and thus helps not only to measure educational achievements, but also to improve it. The techniques of evaluation are necessary for collecting evidence about the students' development in desirable direction. In its highest form, evaluation brings out the factors that are inherent in students' growth such as proper attitudes and habits, manipulative skills, appreciations and understandings in addition to the conventional acquisition of knowledge.

7.3.1 PURPOSES OF EVALUATION

The following are the purposes of evaluation:

- To provide for the collection of evidence which will show the degree to which the pupils are progressing towards curricular goals.
- To permit teachers and supervisors evaluate the effectiveness of curricular experiences, activities and instructional methods.
- To make provision for guiding the growth of individual pupils, to diagnose their weaknesses and strengths, to point out areas where remedial measures are desirable.
- To provide a basis for modification of the curriculum or for the introduction of experiences to meet the needs of the individuals and groups of pupils.
- To motivate pupils towards better attainment and growth.

7.3.2 STEPS INVOLVED IN EVALUATION

The process of evaluation involves the following steps:

- *Define the objectives to be tested:* Determining and classifying what is to be evaluated always has priority in the evaluation process.
- *State objectives*: State objectives in terms of behaviour modification i.e. the learning outcomes.
- *Selection of evaluation tools*: After the objectives are clarified, select the evaluation tools and techniques to appraise a group of them.
- *Efficacy of tools:* Ensure that the selected tools satisfy the criteria of validity, reliability, objectivity and usability.

- *Administrability of tools:* Administer the tool of evaluation selected or constructed to assess the selected objectives. This will yield raw scores of the students.
- *Interpretation of data:* Interpret the scores obtained using various methods of interpretation.
- *Application of results:* Apply the results of evaluation to the teaching methods, learning activities and experiences.

7.3.3 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit

1. Thus evaluation is integrated with the whole task of education and its purpose is to improve ----
2. The purpose of evaluation is to modify the ---------- of the course

7.4 TYPES OF EVALUATION

Many types of evaluation exist, consequently evaluation methods need to be customised according to what is being evaluated and the purpose of the evaluation. It is important to understand the different types of evaluation that can be conducted over a program's life-cycle and when they should be used. The main types of evaluation are process, impact, outcome and summative evaluation. There are various types of evaluations but two main philosophical approaches are **formative** and **summative**.

7.4.1 FORMATIVE EVALUATION AND ITS DEFINTION:

The concept of formative and summative evaluation was given by Michael Seriven in 1967. Generally, in teaching-learning process the whole content is presented to pupils in small units, and at the end of each unit students are given tests and their weaknesses are diagnosed. After diagnosis, remedial teaching is arranged and then formative test is given. Thus, formative test is constructed to evaluate each unit. Such tests are used to make teaching-learning more effective and to give students opportunity to get mastery over the content matter. Here, more emphasis is laid on the achievement rather than objectives. In other words, such tests are employed to monitor the instructional process and to know whether the learning process is taking place properly or not. This process works in a long term and so, it is regarded as

continuous evaluation of which unit tests, class tests and assignments are the essential components. To some others, when any educational plan is evaluated during the developmental stage and corrected accordingly, then this type of evaluation is known as formative evaluation. Whenever and educational plan is evaluated to increase its quality, effectiveness, desirability and utility then it is known as formative evaluation. Thus, it is clear that any educational plan, if evaluated and corrected before finally approving it, then it is formative evaluation.

In exact terms formative evaluation has been defined as under

"Formative evaluation is concerned with judgements made during the design or development stage of a programme which are directed towards modifying, forming or otherwise improving the programme before it is completed". **-A.J. Nitko**

"Formative evaluation is conducted to monitor the instructional process, to determine whether learning is taking place as planned". **- Ebel and Frisble**

"Formative evaluation occurs over a period of time and monitors student progress". **-Wiersma and Jurs**

7.4.2 CHARACTERISTICS OF FORMATIVE EVALUATION

Following are the main characteristics of formative evaluation.

1. Its design is flexible and exploratory.
2. It is a continuous evaluation.
3. It lays emphasis on molecular analysis.
4. It is cause seeking in nature.
5. Due consideration is given to broader experiences of programme users.
6. Local effects of a particular programme are ignored here.
7. It helps in tracing influential variables.
8. It focuses on detailed analysis of instructional material needed for the successful implementation of the programme or effectiveness of teaching-learning process.

7.4.3 SUMMATIVE EVALUATION AND ITS DEFINTIONS

Summative test is given to students at the end of the year to measure the educational attainments and achievement of and to determine the grade or division or certificate for the individual learner. It provides a complete picture of the progress of the learner individually and aims at total evaluation of the learner. So, summative evaluation is supposed to be comprehensive rather than narrow. In other words, from summative evaluation on one hand is judged the general level of student and on the other hand, effectiveness of teaching and instruction is evaluated simultaneously.

Thus, it provides reinforcement to teacher and helps in planning and organizing further teaching programmes. On the basis of students' performance, it can be judged to what extent objectives have been realized keeping in view effectiveness of the teaching. Such knowledge helps us to decide whether the scheme or plan should be continued or not. To illustrate the same in a simple manner, suppose, a teacher has to refer a book to his students, and he after evaluating several available books on the topic refers a particular book, then this sort of evaluation is known as summative evaluation. Thus, it is clear that summative evaluation is a process of selecting the best out of available alternatives.

In exact terms summative evaluation has been defined as under

"Summative evaluation describes judgements about the merits of an already completed programme, procedure or product". **- A. J. Nikto**

"A Summative evaluation can provide evidence that the programme is satisfactory and should be continued to next year's students or if it is unsatisfactory a new programme is needed". **- Gilbert Sax.**

"Summative evaluation is done at the conclusion of instruction and measures the extent to which students have attained the desired outcomes".

-W. Wiersma & S.G. Gurs

7.4.4 CHARACTERISTICS OF SUMMATIVE EVALUATION

Following are the main characteristics of summative evaluation.

1. It focuses on analysis.
2. It tends to stress local effects.
3. It is non-reactive and un-obtrusive.
4. It provides detailed analysis.
5. It requires well-defined evaluation designs.
6. It concerns with wide range of issues.
7. Instruments used here are reliable and valid.

7.4.5 DIFFERENCE BETWEEN FORMATIVE AND SUMMATIVE EVALUATION:

Formative Evaluation	**Summative Evaluation**
1. Its purpose is to diagnose the strength and weaknesses of the students.	1. Its purpose is to classify and promote the students on behalf of their achievement.
2. It focuses on improvement in students' achievement.	2. It focuses on evaluation of students' performance.
3. It forms an integral part of the total teaching-learning process.	3. It is considered as an end of the content matter.
4. It is carried during the course of teaching and instruction.	4. It is done at the end of the academic session.
5. Information and evidences collected here are used as reinforcement for further progress of the teacher as well as of the student.	5. Evidences and results obtained are used to determine grade and certificate for individual learner.
6. It is meant for continuous evaluation through unit tests, assignment etc.	6. It is simply meant for terminal tests, annual tests and external examinations.
7. Here continuous feedback is provided both to the teacher and student.	7. Here, no such feedback is provided either to the teacher or to the student.
8. Here, we get relevant informations which help in improving teaching-learning process.	8. Here, we get over-all information about the success or failure of the entire instructional programme.
9. Here, we arrange remedial teaching and enrichment programmes for backward and gifted students respectively.	9. Here, we make provision for placement and predictions keeping in view student's future needs.
10. Finally, this is achievement based evaluation.	10. Finally, this is objective based evaluation.

7.4.6. CONTINUOUS AND COMPREHENSIVE EVALUATION

Continuous and Comprehensive Evaluation was formulated by Ministry of Human Resource Development, Sibal. This is the new teaching method introduced recently to decrease the accumulated stress of board exams on the students and to introduce a more uniform and comprehensive pattern in education for the children all over the nation. CCE helps in improving student's performance by identifying his/her learning difficulties and abilities at regular time intervals right from the beginning of the academic session and employing suitable remedial measures for enhancing their learning performance. CCE is the modern method of evaluating all the prime dimensions of a student's personality that of how much he has been through out.

New scheme of evaluation

As a part of this new system, student's marks will be replaced by grades which will be evaluated through a series of curricular and extra-curricular evaluations along with academics. The aim is to reduce the workload on students and to improve the overall skill and ability of the student by means of evaluation of other activities. Grades are awarded to students based on work experience skills, dexterity, innovation, steadiness, teamwork, public speaking, behavior, etc. to evaluate and present an overall measure of the student's ability. This helps the students who are not good in academics to show their talent in other fields such as arts, humanities, sports, music, athletics, etc.

7.4.7 MARKS AND GRADES

In CCE, the marks obtained in an exam are usually not revealed. However, equivalent grades, which would be deduced using a special method by the teachers during evaluation would be revealed. This is considered as a drawback since a child with 92 marks will get the same grade as the child with 100 marks and their talents cannot be recognized by anyone else other than their teachers. Though this system might have some drawbacks it instills this value that students need to compete with themselves to get a better grade and not with others.

The grading system is as follows

CGPA	Grade	Qualified	Merited
9.1-10.0	A1	Yes	Yes
8.1-9.0	A2	Yes	Yes
7.1-8.0	B1	Yes	Upon upgradation
6.1-7.0	B2	Yes	Upon upgradation
5.1-6.0	C1	Yes	No
4.1-5.0	C2	Upon upgradation	No
3.1-4.0	D	Upon upgradation	No
2.1-3.0	E1	No	No
1.1-2.0	E2	No	No

Examination pattern

Unlike CBSE's old pattern of only one test at the end of the academic year, the CCE conducts several. There are two different types of tests. Namely, the *formative* and the *summative*. Formative tests will comprise the student's work at class and home, the student's performance in oral tests and quizzes and the quality of the projects or assignments submitted by the child. Formative tests will be conducted four times in an academic session, and they will carry a 40% weightage for the aggregate. In some schools, an additional written test is conducted instead of multiple oral tests. However, at-least one oral test is conducted.

The summative assessment is a three-hour long written test conducted twice an year. The first summative or *Summative Assessment 1* (SA-1) will be conducted after the first two formatives are completed. The second (SA-2) will be conducted after the next two formatives. Each summative will carry a 30% weightage and both together will carry a 60% weightage for the aggregate. The summative assessment will be conducted by the schools itself. However, the question papers will be partially prepared by the CBSE and evaluation of the answer sheets is also strictly monitored by the CBSE. Once completed, the syllabus of one summative *will not* be repeated in the next. A student will have to concentrate on totally new topics for the next summative.

At the end of the year, the CBSE processes the result by adding the formative score to the summative score, i.e. 40% + 60% = 100%. Depending upon the percentage obtained, the board will deduce the CGPA and thereby deduce the grade obtained. In addition to the summative assessment, the board will offer an optional online aptitude test that may also be used as a tool along with the grades obtained in the CCE to help students to decide the choice of subjects in further studies. The board has also instructed the schools to prepare the report card and it will be duly signed by the principal, the student and the Board official.

7.4.8 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

3. Continuous evaluation through unit tests and assignment is called ----------

4. The terminal tests, annual tests and external examinations are called ------

5 ---------- is the modern method of evaluating all the prime dimensions of a student's personality that of how much he has been through out.

7.5 TECHNIQUES AND TOOLS OF EVALUATION

You rnay recall evaluation involves decision making. We can make rational decisions if we have necessary information or data. Various tools and techniques are used for collecting information. In order to select the most appropriate tool and/or technique 'for a givene valuation situation, it is necessary to acquaint ourselves with various types of tools and techniques. Selection of tools and techniques is critical to the whole evaluation process. It does not matter how carefully you have planned an educational activity or an effort if inadequate instruments are involved, because poor tools can lead to 'poor' decisions. This means that the selection of an appropriate tool for evaluation purposes is essential, though we may be familiar with the wide variety of tools that exist.

In this Unit we present to you a few criteria which are applied in selecting one tool from among alternatives. This will serve the major purpose of this Unit, i.e.to provide an overview of the various types of tools and techniques used in evaluation processes.

7.5.1 QUESTIONNAIRE

Questionnaire method of assessing personality traits consists in questioning the individual himself by drawing up a list of questions pertaining to the particular trait and asking the candidate to record his answers on the questionnaire itself by drawing a circle around ‘Yes’ or ‘No’. It presents a variety of situations which are likely to confront a person in the normal course of his daily life and aims to measure neurotic tendency, anxiety, introversion-extroversion, dominance-submissiveness, fear, anger, humour or incidence of inferiority, likes, interests, beliefs, preferences, attitudes, opinions, confidence and sociability etc. For each situation several possible

answers are presented and the subject has to indicate the one which most adequately characterizes his behaviour. A personality inventory, thus, is like a Paper-Pencil-Test.

The psychological questionnaires require one to answer questions which touch on what he has done in the past, how he feels about certain matters concerning his adjustment now and how he thinks he might act with respect to given situations in future. In some inventories direct questions are asked, in others the purpose of the enquiry is disguised. The form of the inventory varies according to variation in selecting questions. For example, Minnesota Multi-purpose Personality Inventory (MMPI) is meant for measuring different personality traits both in the normal and abnormal persons, California Personality Inventory (CPI) intends for self-appraisals of both self and social adjustment, All port-Vernon scale measures economic, political, social, religious and aesthetic values etc.

An ideal form of a questionnaire is presented here-

Do you often feel just miserable?	Yes/No
Do you often feel that time is passing away fast?	Yes/No
Do you like to be let alone?	Yes/No
Do you have sound sleep?	Yes/No
Do you join social functions?	Yes/No
Can you stand noise?	Yes/No
Are your feeling easily hurt?	Yes/No
Does criticism disturb you greatly?	Yes/No

The Questionnaire Method is, however, objectionable on the ground that it demands answers either in the affirmative or in the negative, while the vast majority of individuals would prefer an intermediate answer. Apart, it has few more limitations.

7.5.2 RATING SCALE

Rating scale is one of the important methods of assessing personality traits. The measurement of personality with a graduated scale is called Rating-Scale. It consists in asking certain persons, who know the candidates to be assessed on certain traits. The idea behind this procedure is that people who have known a candidate for some time while living or working with them can certainly form an opinion about him and can estimate his particular quality or trait asked for more objectivity. But, human beings, as they are, the judges can have their own subjective judgements and may differ from other judges.

- Rating scale is an important technique of evaluation. Rating is the assessments of a person by another person. This is one of the oldest methods of personality assessment.There are certain general approaches to assess personality like holistic or overall approach, projective test approach and trait approach. In this rating scales and inventories come under the trait approach.
- Barr & others define rating as: "Rating is a term applied to expression of opinion or judgement regarding some situation, object or character. Opinions are usually expressed on a scale of values. Rating techniques are devices by which such judgements may be quantified".

A rating scale is a device by which the opinion concerning a trait can be systematized

- Three point scale

Above average / Average / Below average

- Five point scale

Excellent / Very good / Good / Average / Poor

- Seven point scale

7.5.3 OBSERVATION METHOD

Observation is of great value in throwing light on the personality traits. The purpose of observation is to watch social behaviour, likes and dislikes and leadership qualities. Here, the experimenter has simply to observe the behaviour of the individual. If he finds that good traits are present in his behaviour, he tries to know to what degree they are present in him. This is a very long process, thus it takes a very long time in deciding the character of the child.

Observation is done in two ways, viz., (a) observation under natural conditions, and (b) observation under controlled conditions. Observation under natural conditions is the method, when the investigator himself observes and makes the assessment of the traits expressed by the individual in his overt behaviour in certain situations. The investigator is the impartial spectator and his observation is not to be influenced by his own desires, wishes or hopes to fit in the data for his own pet theory. In the study of personality traits, it is found of use when we study children's behaviour in the class, on the play-ground and other social occasions. The keen eye of the teacher can see, if a child comes to school in time, does his home-work regularly, sits in the last bench, never asks a question in the class does not speak much with other children, and is hardly seen participating in games, dramatics or other cultural

activities. Such a child can be spotted as a very shy or withdrawn child. Direct observation is also done in the play room, in a child guidance clinic, where it may be observed that a child picks up many toys from the shelf, throws some on the ground, kicks some and breaks the legs of some male toys or the neck of an elephant. He splashes water from the bucket all over the floor. Such a child is very aggressive. He may later be found to be suffering from deprivation of love and his case-study may reveal that his real mother died some years ago and that he was looked after by his step-mother who naturally could not give him the love of the real mother and so the child was destructive and aggressive wreaking his revenge on everything, person or toys he comes in contact with. For close observation, the observer is to be well-motivated and keenly interested to look for the traits, with a great deal of objectively, who should record his views and impressions soon after the session and not to postpone the recording, as lapses of memory may distort the data.

Observation under controlled conditions or experimentation may also be used to study specific personality traits such as honesty, cheating, deceit or lying, self-control, co-operation, social-service, self-denial, charity persistence etc. Hartshorne and may reported some experimental procedure adopted to study some personality traits. For example, a dictation from some difficult text was given to children in a class. The scripts were collected and the spelling mistakes committed by each child were recorded without making any mark or remark on the scripts. These evaluated scripts were handed over back to the children after some time and they were asked to check their spelling mistakes themselves by comparing the scripts with the text. Naturally, some children had the temptation to correct ‘e’ here or ‘o’ there and counted the mistakes according to their own marking. The difference in the number of mistakes recorded by the investigator and by the child himself gave an indication of the degree of dishonesty shown by some children, through some were found honest and some less honest than some others. In a similar manner cheating as a trait could be studied by asking a group of children to write down the names of all the books they had seen, consulted or read during the last year. The lists drawn up by each child were to be checked by putting questions to each child to test if he ever knew the book. The degree of cheating could be known from the number of titles put in the list by each child without knowing anything about them. Co-operation could also be tested by asking children to contribute as much money as they could from their own pocket money to the relief fund of flood affected people. In a room a tray or box was put for

the money to be deposited by individual children going into the room one by one. There was also a device installed in the room by which any child putting the money in the tray could be seen as reflected by a mirror in the ceiling. The amount donated by each child could be thus known. Some may not have donated at all. The amount of the money thus donated by each child could be taken as the basis of the measure of children's sense of co-operation to help in such a case. This could also reveal their sense of social service. Some such experimental situations can be created to bring out the character traits and to assess them in different children or others. This second type of observation is also known as situational tests.

7.5.4 INTERVIEW METHOD

The interview is a popular method of appraising personality. In selections for various jobs the selection committees or even public service commission interview candidates with a view to find out the more suited candidates for the job. The suitability for the job implies certain qualities, attributes or traits which should be present in the candidate. This requires job analysis to pin down the traits to be looked for in the more suitable candidates. The candidates have to be asked pin-pointed questions to bring out these traits. The task of putting questions to the candidate can be divided among members of the selection committee who are supposed to come prepared for putting the relevant questions and thus interview require planning and adequate preparation beforehand. It should follow a definite scheme and aim should be to elicit relevant information and not to harass the candidate. Actually, nterview is a face-to-face meeting of the subject and the experimenter in which the subject is encouraged to talk freely without any inhibition so that he can express himself freely. The experimenter simply listens to him and accepts all that he says without comment. If anything he nods or says some encouraging word, it is just to help and induce him to continue talking as intimately and freely as he likes. Again, while the subject is engaged in answering questions, the experimenter makes his observations regarding his postures, manner of speaking, his hesitations, his fidgeting, his emotional responses and the like. The interview together with the opportunity for close observation yields a fairly intimate picture of the person and an experienced interviewer is able to size up the interviewed people fairly correctly.

In spite of all this, the interview method is subjective and is less valid. Its success rests on the rapport established between the interviewer and the interviewed, a friendly, intimate and personnel approach is necessary and this is not always easy to

secure. The interview should always be in a cheerful atmosphere not in a jockey atmosphere.

7.5.5 INVENTORY

Definition: A personality inventory is an assessment tool used to determine which of these personality types a person falls into: extroverted, introverted, thinking, feeling, sensing, intuitive, judging, and perceptive. It is used as part of a self assessment done for career planning purposes.

Examples:

The career counselor administered a personality inventory called the Myers Briggs Type Indicator (MBTI Personality Inventory for Children. The Personality Inventory for Children, related questionnaires provide objective multidimensional evaluation of children and adolescents through complementary, although independent, application of descriptions obtained from parents and teachers, as well as from the student being evaluated. The 275-item parent-completed PIC-2 and 270-item student-completed Personality Inventory for Youth (PIY) were written at a high 3rd-/low 4th-grade reading comprehension level and require a true or false response to descriptions of behavior (My child sometimes swears at me. I often disobey my parent(s).) affect (My child is usually in a good mood. I hardly ever smile.), ability (My child often has trouble finding the right words to say. It is hard for me to make good grades.), as well as family status (There is a lot of tension in our home. My parent(s) do not understand me.) and peer relations .

7.5.6 ASSIGNMENT

As challenging as the design and interactive teaching of writing assignments are, perhaps the most challenging aspect of incorporating writing assignments into an engineering or science course is evaluating those assignments. Here, evaluation does not mean simply assigning a grade, but constructing a process in which the students receive useful feedback that serves to tell them not only what should be strengthened in the writing, but also what was done well.

A well-done evaluation has three attributes: clarity, consistency, and a sense of hierarchy. By clarity, I mean that your marks on the paper clearly identify what the weakness (or strength) of the writing is, and if a revision is proposed, then what that revision is. By consistency, I mean that your evaluation is such that students feel as if the evaluation was based on logic, not whim. Also, students feel as if everyone was graded fairly. By a sense of hierarchy, I mean that your evaluation emphasizes the

most important weaknesses (and strengths). Moreover, students understand that not all writing faults are equal in importance.

7.5.7 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit

5. --------- ------- is the modern method of evaluating all the prime dimensions of a student's personality that of how much he has been through out.
6. Inventory which is meant for measuring different personality traits both in the normal and abnormal persons is called------
7. Personality Inventory which intends for self-appraisals of both self and social adjustment is called---
8. ---- -------- scale measures economic, political, social, religious and aesthetic values.
9. The measurement of personality with a graduated scale is called --- ------
10. The purpose of observation is to watch---------- -

7.6 ACHIEVEMENT TEST

Scholastic achievement tests constitute an important tool of evaluation. It is necessary for the teacher to know how far the pupils have attained in a particular subject area. In the school evaluation programme, various forms of achievement tests are used to measure the accomplishment of the pupils.

7.6.1 DEFINITION

"Any test that measures the attainments or accomplishments of an individual after a period of training or learning is called an achievement test". – **Downie**

"An achievements test in a proficiency test used to ascertain what and how much has been learnt or how well a task can be performed, the focus being on evaluation of the past without reference to the future, except for the implicit assumption that acquired skills and knowledge, will be useful in their own right in the future" – **Super, D.E.**

"An achievement test is a test designed to measure a person's knowledge, skills, understanding, etc., in a given field taught in a school." – **Good's Dictionary**

"Achievement test is a test designed to measure the effects of specific teaching or training in an area of the curriculum".

- The International Dictionary of Education

"Achievement tests are useful aids for diagnosing a student's specific learning needs, for identifying his relative strength and weaknesses, for studying his progress and predicting his success in a particular curriculum. Of all the different types of tests, achievement tests are used most frequently". **– Waters**

From the above definitions, a more comprehensive definition of an achievement test can be stated as: Achievement test is an instrument

designed to measure the accomplishment of the students in a specified area of learning, after a period of instruction.

7.6.2 FUNCTIONS OF ACHIEVEMENTS TESTS

The major functions of achievements test are that they

- Provide basis of promotion to the next grade.
- Help in finding out at the beginning of the year where each student stands in the various academic areas.
- Help in determining the relative position of a student in a particular subject or area of learning.
- Motivate the students before a new assignment is taken up.
- Help the teacher to see for himself how effectively he is doing, what is getting across pupils and what is not.
- Provide the teacher evidence relating to the realisation of the objectives, effectiveness of the learning experiences provided and mode of instruction employed.
- Help the teacher in identifying pupils' difficulties and arranging for remedial measures.

7.6.3 PREPARATION OF OBJECTIVE BASED ACHIEVEMENT TEST

The preparation of a good test is a systematic process having well defined stages. The important steps envisaged in the preparation of a good teacher-made test are as under.

- Planning the test
- Preparation of a design
- Designing the test items

- Reviewing and editing
- Arranging the items
- Providing directions
- Preparing the scoring key and marking scheme
- Administering the test and scoring
- Evaluating the test

Planning the test

"Test planning encompasses all of the varied operations that go into producing the test; but it must also involve careful attention to test item difficulty, to type of test items, to directions to the examiner". (Lindquist, E.F). We shall cover most of these considerations under the heading; preparation of design for the test or blueprint of the test.

Preparation of design

Designing is the first and most important step in the test construction. At this stage, the test constructor has to take a number of decisions regarding selection of the objectives, the selection of the content, form of questions, the difficulty level of test items and the weightages to be allotted to the objectives, to the content and the form of questions. The set of those decisions will be called the design of the test from an analogy with the work of an architect. Important decisions have to be taken concerning the following.

i) Identification of the objectives and allotting weightage to the objectives

The most important step while planning a test is the identification of the instructional objectives and stating them in terms of specific observable behaviour. After the objectives are identified and stated, the test maker has to decide their relative weights in the test. The fundamental principle to be observed here is that the test should reflect the actual emphasis being given to various mental processes during instruction. These weights will be by and large a function of time, effort and resources spent on their acquisition as also for the importance for the society and the learning of the subject in terms of retention and transfer value. The simplest basis for assigning the weights could be to weight them in terms of time devoted for their achievement. weightages could, of course, be given in numerical terms, distributing 100 points over the objectives, giving the greatest number to those that are to receive the greatest emphasis.

For the sake of illustration, given below are the objectives identified for teaching some units in mathematics and the weightage allotted to them.

SHOWING THE WEIGHTAGE ALLOTTED TO THE OBJECTIVE

S.No	Objectives	Marks Allotted	Percentage
1.	Knowledge	5	20
2.	Understanding	8	32
3.	Application	10	40
4.	Skill	2	8
Total		25	100

ii) Selection of the content and allotting weightage to the content

Content being the means through which objectives are attained, it becomes very necessary to decide the weights to be given to different parts of it. A convenient number of units can be selected for testing. In assigning relative weights to units a number of factors will have to be taken into account. However, the easiest method to decide weightages, may to be base them on the time required to teach various units and relative importance of each unit.

For the sake of illustration, given below is the table indicating the weightages given to three units.

WEIGHTAGES GIVEN TO POLYNOMIALS, FUNCTIONS AND QUADRILATERALS

S.No	Unit	Marks Given	Percentage
1.	Word	10	40
2.	Excel	8	32
3.	Powerpoint	7	28
Total		25	100

iii) Selection of the form of questions and giving weightage to the questions:

The test-maker has to decide about the form of questions to be used, the number of questions to be chosen and the relative weightage to be given to each form. Perhaps judicious combinations of the different forms will have to be used in achievement tests. However, among the objective type questions, multiple choice may be given more weightage.

In the question paper which is being taken for illustration, the weightage to different forms of questions could be as follows.

WEIGHTAGE GIVEN TO DIFFERENT FORMS OF QUESTIONS

S.No	Form	Marks Given	Percentage
1.	Essay (E)	6	24
2.	Short Answer (S.A)	9	36
3.	Objective Type (O)	10	40
Total		25	100

iv) Distribution of difficulty level

A decision also has to be taken concerning the distribution of difficulty level. To get optimum discrimination through a test, most of its questions should be of average difficulty level. A few easy questions, to motivate the below average students and a few difficult ones to challenge the gifted should find a place in the question paper. If achievement can be assumed to be normally distributed, some weightages in terms of percentages can be suggested for easy, average and difficult questions as shown in table.

DISTRIBUTION OF DIFFICULTY LEVEL FOR QUESTIONS

S.No	Difficulty level	Percentage
1.	Difficult questions	15
2.	Average questions	70
3.	Easy questions	15
Total		100

v) Preparation of blueprint: (Table of specifications)

Preparation of the blueprint refers to the final stage of the planning of a test. The blueprint is a three dimensional chart showing the weigthage given to the objectives, content and the form of questions in terms of marks. It is also called a table of specifications as it relates outcome to the content and indicates the relative weight given to each of the various areas. The units or the content are spread along the vertical axis while the objectives are listed on horizontal axis. Each column is further subdivided into columns that indicate the forms of questions. Thus we get a number of cells, each cell having three dimensions, the objective, the content and the form of question. What is required on the part of the test maker is to fit in all the

questions in different cells in such a way that the blueprint reflects the decisions of the design(er). When this is done, all rows and columns are balanced, the blueprint is ready. It is illustrated in table.

Sl.No	Objectives	Knowledge			Understanding			Application			Skill			Total
	Content	E	SA	O	E	SA	O	E	SA	O	E	SA	O	
1.	Word			1 (2)		3 (1)	1 (1)		3 (1)	1 (1)				10
2.	Excel			1 (2)		3 (1)	1 (1)			1 (2)				8
3.	Powerpoint			1 (1)				4 ( )			2 ( )			7
	Total	5			8			10				2		25

Note: The number inside the bracket indicates the number of questions and the number outside the bracket indicates the marks allotted to each question.

Uses of Blueprint

The preparation of the blueprint serves the following purposes. The blueprint:

- Helps to improve the content validity of the test.
- Defines as clearly as possible the scope and emphasis of the tests.
- Relates objectives to the content
- Gives greater assurance that the test will measure learning outcomes and course content in a balanced manner.
- Lays before the tester a complete picture of the test he is going to prepare.

Writing the Test Items

When the blueprint is ready the next step is to prepare or select the items. Take each cell of the blueprint and draft an item taking care of the various dimensions; the objective, the content and the form as laid down in the blueprint. The decision concerning the distribution of difficulty level also has to be implemented at this stage itself. It is always desirable to prepare more items than the requirement of the cells of the blueprint since defects are likely to become apparent in some items during the later review.

Reviewing and Editing

The pool of items for a particular test after being set aside for a time can be reviewed by the help of experts. A more careful evaluation of the items can be made by considering them in the light of each of the following questions.

- Does each item measure an important learning outcome included in the table of specifications?
- Is each item appropriate for the particular learning outcome to be measured?
- Does each item present a clearly formulated task?
- Is the item stated in simple, clear language?
- Is the item free from extraneous clues?
- Is the difficulty of the item appropriate for the students to be tested?
- Is each item independent and are the items, as a group, free from overlapping?
- Does each item fit into one of the cells of the blueprint?

Arranging the Items

When the final selection of the items has been completed and they are ready to be assembled into a test, decision must be made concerning the best item arrangement. The following suggestions provide guidance for this purpose.

- The items should be arranged so that all items of the same type are grouped together.
- The items should be arranged in the order of increasing difficulty.
- It may be desirable to group together items which measure the same learning outcomes or the same subject matter content.

Providing Directions

Directions constitute an inseparable part of a test. Directions should contain information concerning each of the following: (1) purpose of the test (2) time allowed completing the test (3) how to record the answers (4) whether to guess when in doubt about the answer (5) marks allotted for each question as also for each section of the test.

Preparation of Scoring Key and Marking Scheme

It is necessary to prepare a scoring key for objective type questions and marking scheme for supply-type questions, such as short answer and essay type questions for scoring the test objectively.

Scoring key and marking scheme

Scoring key refers to the prepared list of answers to a given set of objective questions. The examiner compares the answers given by the students with those in the scoring key and thus arrives at the marks to be awarded to the students.

In the preparation of marking scheme in mathematics it is desirable to analyze the solution into important stages and to distribute marks. The mark for each stage may be divided into two components: marks for the method and those for accuracy. A marking scheme is essential because it indicates:

- The number of steps or learning points expected in the answer
- The outline of each point or step expected in the answer
- The weightage to each point or each step
- The level of accuracy expected of each step

Administering and Scoring the Test

At this step, it is important to make sure that all students know exactly what is expected of them and to provide them with the most favorable conditions for taking the test. After the administration of the test, the scoring can be done with the help of the scoring key and marking scheme. An illustration for the scoring key and marking schemes are given in tables.

ILLUSTRATIONS FOR THE FORMAT OF MARKING SCHEME

Q.No	**Value point Expected Answer**	**Marks allotted for each step**	**Total marks**
1.	For writing the definition of the Key correctly For writing at least one example for For writing the Set in the : (i) the key (ii) form of the key	1 mark 1 mark ½ mark ½ mark	3

Evaluating the test

Evaluating the test helps the teacher to ascertain the following:

- Was the test very easy or very difficult?
- Was the test too long or too short?

- Were the directions clear and specific?
- Was the test practicable and feasible?
- Did the items measure the intended objectives?
- Did the difficulty level of the questions match the level of the students?
- Were the items clear and unambiguous?
- Were the distracters effective?
- Do the items discriminate among the different levels of achievers?
- What are the misconceptions formed by the student?
- How effective were the learning experiences provided during the instruction?

Evaluation can be done at two levels:

i) Question-wise analysis

ii) Item analysis

Question-wise Analysis

Question-wise analysis is done by analyzing each question according to objective, specification, content, question, type, estimated difficulty level and time required. Format for the question-wise analysis is given in table. This helps the teacher in assessing the effectiveness of the test item with reference to the objectives and other requirements in the blueprint. This also gives an insight into the difficulties encountered by students in taking the test.

FORMAT FOR QUESTION-WISE ANALYSIS

Q.No	***Objective***	***Specification***	***Form of Question***	***Unit***	***Marks allotted***	***Time in Minutes***	***Difficulty Level***
1.	Knowledge	Recalls	Objective (MC)	Word	1	1	E*
2.	Understanding	Identifies	Objective (MC)	Excel	1	1	A*
3.	Application	Selects	Objective	PowerPoint	1	1	D*

*** E = Easy; *A = Average *D = Difficulty**

Item analysis

Item analysis is the process by which the test maker evaluates the effectiveness of the test item in terms of (i) the difficulty level of the test items (ii) discriminating power of test items and (iii) the effectiveness of the distracters. For item analysis the teacher arranges the test papers in the ascending order of marks and

analysis is done for 27% of the students on the high and low end of the scales and making sure that there are an equal number of students in both the groups. Students' responses to each item is analyzed for the students in upper and lower groups. Other than the purposes mentioned above, item analysis has several other benefits too.

- It provides useful information for class discussion of the test
- It provides data for helping the students to improve their learning.
- It provides insight and skill which lead to the preparation of better tests on future occasions.

7.6.4 CHARACTERISTICS OF A GOOD ACHIEVEMENT TEST

The following are the qualities of a good achievement test.

- *Reliability*: Reliability of a test is its trustworthiness or its consistency. It is defined as "the consistency with which a test measures what it intends to measure".
- *Validity:* Validity means purposiveness. Validity of a test is the "accuracy with which a test measures what it intends to measure".
- *Objectivity:* A test is said to be highly objective if the score assigned by different, but equally competent scores are not affected by the Judgement, personal opinion or bias of the scorers.
- *Feasibility:* In assessing the value of a test usability or practicability is an important criterion. Ease of administration, ease of scoring, ease of interpretation etc, are factors contributing to the practicability of any test.

7.6.5 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

11. *Any test that measures the attainments or accomplishments of an individual after a period of training or learning is called an* -------
12. ---------- test--helps in determining the relative position of a student in a particular subject or area of learning.
13. ----------test- Motivates the students before a new assignment is taken up.

7.7 COMPUTER-AIDED ASSESSMENT

Computer-aided assessment (e-assessment) ranges from automated multiple-choice tests to more sophisticated systems. With some systems, feedback can be geared towards a student's specific mistakes or the computer can navigate the student through a series of questions adapting to what the student appears to have learned or not learned. Formative assessment shifts out the incorrect answers, and these questions are then explained by the teacher. The learner then practices with slight variations of the sifted out questions. The process is completed by summative assessment using a new set of questions that only cover the topics previously taught.

7.7.1 ONLINE EXAMINATIONS

Online Examination helps the students for appearing the exam by online. Its mission is to offer a quick and easy way to appear the exam and it also provide the result immediately after the exam. Through partnerships with agencies\boards which are conducting the multiple choice type examination, it can provide special advantages to the applicants/students that can't be found anywhere else. The working of the project is as follows. The first page provides several links. The Home link contains several information about online examination; it provides a link to the login page. In the Login link a user have to login before entering for the exam. An already registered user can simply type in his\her valid username and password, and then click the "Login" button. Already registered user can only register a new user as a teacher. But those visitors who are not registered have to go to the registration page for registering only as a student before they login. In that page user have to enter Name, Address, Phone number, Role id and password; and also the user have to update the photo.

About Link contains some information regarding Online Examination and its developers.

After registration, if the user registered as a teacher can create the question and can conducting the exam can also publishing the results and reports. Otherwise the user registered as a student and he/she can answer the exam. The Login page contains several links according to whether the user is student or teacher.
If the user is a teacher, then he/she can create question paper. This is provided by Create Question Paper Link. In that page user have to enter Exam ID, No: of Series, No: of questions, No: of Options, Total time (in min), Marks per Question, Negative

mark, Examination Password, Option type. Then go to the question paper page. In that page user have to enter the questions and options and the right answer. The Link Question Paper Preview shows already created question paper. If the user is a student, can answer the exam. This is provided by the Link Examination. The Link Rules and Regulations show some rules and regulations that should be followed by the user.

Delivery system/System requirements

- The server requirements is an NT server or above.
- The system runs on the Web (browser).
- Client requires any browser on any operating system.

7.7.2 CREATING DATA BANKS AND TESTS WITH THE ON LINE EXAMINATION SYSTEM

- Online examination questions can be categorized according to topic, types, etc. (libraries)
- The online examination system makes provision for difficulty levels of items.
- A test can be compiled with questions from different topics/libraries.
- A "serial number" is provided for each question according to topic, etc.
- The "serial number" can be used to search for and select questions.
- Questions can be converted to the databank from existing databanks.
- Questions can be converted from word processing files.
- Tests can be created on a random basis per student.
- Specific questions can be flagged to be included/excluded in a test.
- The online examination system is suitable for surveys.
- The online examination system can automatically add the marks allocated in each question to determine the total mark for the test.
- A printed paper and a memorandum can be compiled.
- Different papers (shuffle code) and memoranda can be compiled.\
- Export question papers and memoranda to .txt or .doc file

7.7.3 CONTROL MECHANISMS IN THE TEST

- A time limit can be set for the test.
- The sequence of questions can be randomized.
- Online Examination System allows jumping to specific questions based on the previous answer.
- The distracters/options per question can be randomized.

- The online examination system limits the number of times a student can write a test.
- Students can navigate within a test (i.e. backwards and forwards). Can be set. Navigation tools/buttons can be selected for a test, and these buttons can be switched.
- on/off per question/test, e.g. backward/forward buttons.
- Students can be forced to go through all the questions at least once, before exiting the test.
- Students can be allowed to exit the test before completing all the questions.
- After exiting a test, students can continue the test from the last question they answered.
- A specific date for a test to be active can be set.

7.7.4 ONLINE EXAMINATION SYSTEM FEEDBACK

- Feedback on test results can be set on/off.
- Feedback per question can be set on/off.
- Customized feedback per question/test.
- The event of feedback can be set, e.g. after all the questions/after each question/ after a section or library/not at all.
- The examination system indicates what the student answered as well as the correct answer.
- Extra time can be set for students to work through the feedback after test completion.
- Score per question can be displayed in the feedback.

7.7.5 QUESTION TYPES OF THE ONLINE EXAMINATION SYSTEM

- **The following question types are essential:**
  - **Multiple Choices**

    This question type allows the user to select ONE correct answer

    - Options can be randomized
    - More than one option can be correct but the user can only select ONE option
    - Score can be set per option
    - No limitation on number of options
    - If there are a number of Options, these can be presented in a column(s).

- **Multiple Responses**

  This question type allows the user to select more than ONE correct answer

  - Options can be randomized.
  - Score can be set per option.
  - No limitation on number of options.
  - If there are a number of Options, these can be presented in a column(s).
  - The number of responses students enter can be limited.

- **Information page**

  This screen provides information but does not contain a question

  - No limitation on the amount of text (scroll bar).

- **Fill-in the blanks**

  This question type gives the user the opportunity to type in short text answers

  - More than one blank space can be specified to be filled in by the student.
  - System caters for multiple spelling variations.
  - System caters for multiple possible answers.
  - Boolean operators can be used for marking.
  - Score can be set per answer.

- **Hot-Spot**

  This question type gives the user the opportunity to identify an area on the screen (graphic/text)

  - Score can be set per hot spot area.

- **Matching**

  This question type gives the user the opportunity to match data in columns

  - The options in the selection box can be matched to more than one option in the column.
  - Score can be set per match.
  - The options in the selection box as well as options in the column can be randomised.
  - No limitation on the number of options in the column or selection box.

- **Numeric**

  This question type gives the user the opportunity to type in a numeric answer

  - Ranges can be set.
  - The number of decimal places can be limited.
  - The number of decimal places can be set.
  - Score can be set per answer.
  - No text answers can be typed.

- **Calculated (questions are randomly created according to set parameters).**

  This question type gives the user the opportunity to type in a numeric answer

  - Ranges can be set per parameter.

- **Free format**

  This question type gives the user the opportunity to type an open ended answer

  - The field shouldn't be limited.
  - Complete answers can be printed out to be marked by the lecturer.
  - Export answers to .txt or .doc format

7.7.6 OTHER ESSENTIAL REQUIREMENTS OF THE ONLINE EXAMINATION SYSTEM

- Graphic(s) can be included as part of a question.
- Sound can be included as part of a question.
- Video can be included as part of a question.
- Animations can be included as part of a question.
- Scoring per option should be possible.
- Negative marking should be possible in all the question types.
- Preview of a question is available while setting up questions.

Programme requirements

- Text can be formatted easily, e.g. bold, italics, underline.
- Text can be formatted easily within a question, e.g. bold, italics, and underline.
- Templates can be used to set the format of a test.
- Style sheets can be used.
- Graphics and videos can be moved around the screen.
- There is a zoom facility for graphics and videos.

- If there are a number of options, these can be presented in a column.
- The online examination system can handle/insert the greek alphabet, subscripts and superscripts.
- The online examination system can handle/insert "special characters" such as arrows, etc.
- While setting up a test a student preview should be available.
- Completed papers of individuals can be exported to .txt or .doc format.
- The question number can be displayed.
- The number of questions answered can be displayed.
- Remaining time can be displayed. (Can student switch on/off?)

7.7.7 OTHER FEATURES OF THE ONLINE EXAMINATION SYSTEM

- Students can access tests they have completed.
- Both essay type questions and memorandums can be saved in databanks.
- A paper-based test paper can be generated from the databank.
- A test can be saved in text format.

Stability and Speed of the Online Examination System:

- The online examination system is stable while setting up a test.
- The online examination system is stable while students complete a test (at least 160 students per session).
- Answers can be saved in real time (if a power failure occurs the answers must be saved up to that point).
- The speed of delivery of test from the server to work station is acceptable.
- The speed for presenting each question per work station is acceptable.
- The speed for presenting videos and graphics per work station is acceptable.

Security

- Only registered students are able to access a test.
- The test can be made available on specific dates.
- The test can be made available at specific times.
- The number of times students access tests can be set.
- The login time per student is available.
- Logoff time per student is available.
- The online examination system can limit logins to a specific subnet.
- Text files with students details (i.e. names and student numbers) can be used to give students access to tests.

Reporting

- The following results on student performance can be obtained:
    - Student number, name and mark in Excel, Word and txt format.
    - Results per topic per student
    - Average of group
    - Average time used by the students
    - Date and time of test taken
    - Time taken for each individual student to complete the test.
- Full report per question is available, and includes:
    - The difficulty value of a question
    - Discrimination index
    - Standard deviation
    - Graphical presentation of results
    - Number of times a distractor has been selected
- Answers can be saved in real time (if a power failure occurs the answers must be saved up to that point).
- Papers can be remarked after editing a test, e.g if a question is deleted.
- Results must be presented according to the original question/id numbers.
- Report of each individual's answers

Support and training

- Technical support is available in South Africa.
- Extensive training is available to enable clients to use the online examination system to its full capacity.
- There is a quick response time in the event of technical problems.
- There is a service level agreement.

7.7.8 EVALUATING THE ONLINE EXAMINATION SYSTEM

- The client can have the complete online examination system on their network for a trial period.
- Clients have permission to use the online examination system in a “live” test situation for a specified period of time.
- All roleplayers (Telemetric department, lecturers, IT) can be involved in evaluating the online examination system.
- The online examination system can be evaluated by various people.

7.7.9 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit

14. The ----------examination is to offer a quick and easy way to appear the exam and it also provides the result immediately after the exam.
15. The ---------- examination system allows jumping to specific questions based on the previous answer.
16. The -------- examination system limits the number of times a student can write a test.

7.8. DIAGNOSTIC TEST

There are tests which have been designed to provide information about the specific nature of the pupil's difficulties in given subject area. These tests are called diagnostic tests. Any test can be used as a diagnostic test in a limited way by examining students' performance in the individual items which make up the test rather than on the test as a whole. Thus diagnostic tests measure somewhat narrower aspects of achievement than survey tests. In other words, diagnostic tests yield measures of highly related abilities underlying achievement in a subject.

7.8.1 EDUCATIONAL DIAGNOSIS

As is obvious, the term diagnosis has been borrowed from the medical profession where it implies "identification of disease by means of patients' symptoms". The word diagnosis is used more or less in the same sense in education. The only difference perhaps is that in medical diagnosis it is physical or an organ breakdown that is examined, while in educational diagnosis it is the failure of the process of education or learning that is located and attended to be remedied. We may say that educational diagnosis is "the determination of the nature of learning difficulties and deficiencies". Of course, it cannot stop only at the identification of weakness in learning but has to go a little deeper to locate their causes and also suggest remedies for getting rid of them.

7.8.2 NEED FOR DIAGNOSTIC TEST

Most standardized and teacher-made achievement tests are designed to give an indication of how far the student has progressed towards the accomplishment of specific objectives measured by the test. These objectives however are grouped in

broad categories. They cover a broad area and result in a total score which reflects overall achievement in the area tested. Thus the teachers can say that a pupil is doing well in arithmetic or poorly in arithmetic, but they do not know why, not do they know what the concepts are causing difficulty. Such survey (achievement) tools serve a useful function, but in order to help the student with a disability, the teacher will need to analyze the nature of the difficulty and the causes for the trouble. There are tests which have been devised to provide information about the specific nature of pupil's difficulties in given subject areas. These tests are called diagnostic tests. Any test can be used as a diagnostic test in a limited way by examining students' performance in the individual items which make up the test rather than on the test as a whole. Thus diagnostic tests measure somewhat narrower aspects of achievement than survey tests In other words, diagnostic tests yield measures of highly related abilities underlying achievement in a subject. They are designed to identify particular strengths and weaknesses on the part of the individual child and within reasonable limits to reveal the underlying causes.

7.8.3 LEVELS OF DIAGNOSIS

Good diagnosis moves hand in hand with good teaching and a teacher should be as much concerned with it as with the later. Ross and Stanley have identified five levels of diagnosis, which are, (1) who are the pupils having trouble? (2) Where are the errors located? (3) Why did the errors occur? (4) What remedies are suggested? And (5) how can that errors be prevented? The first four are grouped as corrective diagnosis and the last is known as preventive diagnosis. Most of the diagnosis resorted to by teachers will be corrective in Diagnostic Tests sub-skills. Such measures can help the teacher locate the sources of difficulty using which constructive action can be taken.

7.8.4 STEPS CONSTRUCTING DIAGNOSTIC TESTS

Diagnostic tests may be standardized or teacher-made, but teacher-made diagnostic tests will be more effective and economical than standardized tests. The norms which constitute a strong point with standardized tests are not called for in diagnosis as the purpose is to discover the weaknesses of individual students rather than compare their achievements.

The step in the construction of a diagnostic test can be summarized as follows.

- Identification of problem areas
- Detailed content analysis

- Listing all the learning points in the logical sequence
- Writing test items (preferably two or three items of free response type) for each learning point
- Clubbing the items around the learning points.
- Providing clear instructions
- Preparing a scoring key and a marking scheme.
- Providing the time limit as required by individual students.
- Administration of the test.

  After administering the test, the following procedure may be followed for analyzing the performance and identifying the weaknesses.
- Item-wise analysis of the performance of each student.
- Qualitative and quantitative analysis for identifying the strengths and weaknesses.
- Identification of the causes for learning difficulties.
- Preparation of a diagnostic chart for each student.
- Planning and implementing highly individualized remedial programmes.
- Evaluating the effectiveness of the programme.

7.8.5 USES OF DIAGNOSTIC TESTS

The following are the uses of diagnostic test.

The diagnostic tests

- Point out inadequacies in specific skills
- Locate areas in which individual instruction is required
- Finish continuous information in order that learning activities may be most productive of desirable outcomes.

  Serves as a basis for improving instructional methods, instuctional materials and learning procedures.

7.8.6 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

17. The -------- tests indicate how far the student has progressed towards the attainment of the instructional objectives'
18. There are tests which have been designed to provide information about the specific nature of the pupil's difficulties in given subject area are called

    ----

7.9. E-ASSESSMENT

In its broadest sense, **e-assessment** is the use of information technology for any assessment-related activity. This definition embraces a wide range of student activity ranging from the use of a word processor to on-screen testing. Due to its obvious similarity to e-learning, the term e-assessment is becoming widely used as a generic term to describe the use of computers within the assessment process. Specific types of e-assessment include computerized adaptive testing and computerized classification testing. E-assessment can also refer to e-marking.

E-assessment can be used not only to assess cognitive and practical abilities but anxiety disorders, such as social anxiety disorder. Cognitive abilities are assessed using *e-testing* software, while practical abilities are assessed using *e-portfolios* or *simulation* software.

7.9.1 COMPONENTS

An e-testing system designed to focus on lower level associations comprises two components: (1) an assessment engine; and (2) an item bank. An *assessment engine* comprises the hardware and software required to create and deliver a test. Most e-testing engines run on standard hardware so the key characteristic is the software's functionality. There is a wide range of software packages. The software does not include the questions themselves; these are provided by an *item bank*. Once created, the engine uses the item bank to generate a test. Traditional paper-and-pencil testing is similar, but the test is pulled from the bank at only one time, when it is sent to publishing.

The creation of the item bank is more costly and time consuming than the installation and configuration of the assessment engine. This is due to the fact that assessment engines can be bought "off the shelf," whereas an item bank must be developed for each specific application.

An e-assessment system designed to focus on more sophisticated forms of knowledge requires some sort of interactive activity and a system for inviting students to reason or solve problems around that activity. One influential program of research is known as Evidence Centered Design, or ECD. ECD involves the use of Bayesian Inference Nets to create a sophisticated model of student cognition and a set of activities or problems that students work on that allow the system to estimate the individuals understanding of the particular domain.

7.9.2 TYPES OF E-ASSESSMENT

The best examples of E-assessment follow a Formative Assessment structure and are called "Online Formative Assessment". This involves making an initial formative assessment by sifting out the incorrect answers. The author/teacher will then explain what the pupil should have done with each question. It will then give the pupil at least one practice at each slight variation of sifted out questions. This is the formative learning stage. The next stage is to make a Summative Assessment by a new set of questions only covering the topics previously taught.

Formative Assessment In Elearning

A formative assessment in eLearning is designed to monitor a learner's development and provide them with feedback they can use to achieve their goals.

The primary purpose of a formative assessment in eLearning is to offer your learners feedback they can use to improve their eLearning experience. Rather than simply giving them a grade, you are able to identify areas that may need improvement and pinpoint their strengths DURING the eLearning course, in contrast to summative assessment, which is used to determine whether or not a learner achieved the learning objectives and reached the desired level of proficiency at the end of an eLearning course. This constructive criticism and insight can be used to create an action plan moving forward, so that they are able to modify learning behaviors and achieve their learning goals.

Types of Formative Assessment

Goal checks.

Learners are provided with a goal or objective at the beginning of the eLearning lesson. Upon completion they are given an assessment to determine whether they achieved the goal and how far they've progressed. Additional "milestone" goals can also be set for the rest of the lesson or eLearning course.

One-on-one discussion.

The instructor meets with a learner to discuss expectations and assess their current knowledge base and skill sets. Typically, the facilitator will ask each learner a pre-determined set of questions to identify areas of improvement. This can be carried out face-to-face or via an online chat.

Instructor observation.

The instructor observes learners as they are completing online activities and assesses the proficiency and skill level of each individual. This usually involves note-

taking, and possibly a follow-up online face-to-face meeting between the instructor and learner.

Personal online learning logs.

Learners are asked to create a personal online learning log or journal that details what they are learning, their thoughts and feelings about the topic, and the core ideas or concepts of the online lesson. The instructor can then use this log to track the learner's progress.

Group presentations.

Learners work together or independently to create an online presentation that must be presented to their peers. The learners are provided with criteria beforehand, which clarify expectations and specify which skills and information must be used throughout the eLearning project.

Self-assessment.

Learners are encouraged to reflect upon their own eLearning experience and determine their level of proficiency or knowledge mastery. They may also be evaluated by their peers, who give them feedback and insight into their work. This form of online assessment is usually paired with another eLearning activity, such as personal online learning logs.

Summative Assessment In E-learning

Summative assessment in eLearning is used to determine whether or not a learner achieved the learning objectives and reached the desired level of proficiency. Typically, a summative assessment is administered at the end of an eLearning course, and provides learners with a final grade, in contrast to formative assessment, which identify areas that may need improvement and pinpoint their strengths 5 Types Of Summative Assessment

Online multiple choice exams.

Students must choose from a specific set of answers. No written responses are required, and the answers are typically presented at random.

Online Presentations.

Learners create an online presentation that delves into a particular topic, which they must then share with their peers or in a public forum. The online presentation shows their mastery of the subject, and determines whether they have learned the key concepts and ideas.

Creating a website or blog.

This is a modern twist on online presentation assessments, wherein learners are asked to create a site or blog that covers all aspects of the topic in question. They must put the information they find using their own words and create a design for the site, which also tests their communication and technology skills.

Learners' online portfolios.

Throughout the eLearning course, learners are asked to place important online assignments and eLearning activities into an online portfolio, which is then assessed at the end of the term by the facilitator of the eLearning course. They can also create an online portfolio comprised entirely of new work that is used to determine their final grade.

Online group projects.

Learners work with their peers to complete an online group project that showcases their comprehension and skill mastery. For example, they might create a slideshow that highlights the key takeaways from the eLearning course.

7.9.3 ADVANTAGES

E-assessment is becoming widely used. It has many advantages over traditional (paper-based) assessment. The advantages include:

1. lower long-term costs
2. instant feedback to students
3. greater flexibility with respect to location and timing
4. improved reliability (machine marking is much more reliable than human marking)
5. improved impartiality (machine marking does not 'know' the students so does not favour nor make allowances for minor errors)
6. greater storage efficiency - tens of thousands of answer scripts can be stored on a server compared to the physical space required for paper scripts
7. enhanced question styles which incorporate interactivity and multimedia.

7.9.4 DISADVANTAGES

There are also *disadvantages*. E-assessment systems are expensive to establish and not suitable for every type of assessment (such as extended response questions). The main expense is not technical; it is the cost of producing high quality assessment *items* - although that cost is identical when using paper-based assessment.

It has also been noted that in regards to university level work, providing electronic feedback can be more time-consuming than traditional assessments, and therefore more expensive.

7.9.5 CHECK YOUR PROGRESS

Note: Write your answers in the space given below and compare it with given answers at the end of the unit.

19. Cognitive abilities are assessed using *e-testing* software, while practical abilities are assessed using --------- software
20. A formative assessment in eLearning is designed to monitor a learner's development and provide them with ----- they can use to achieve their goals.
21. Summative assessment in eLearning is used to determine whether or not a learner achieved the ----------.

7.10 LET US SUM UP

Implementation of information and communication technologies, as well as emersion of new user interfaces and web 2.0 technologies changes the way of education system, the way of living and business transactions in general. The way we communicate, operate, produce and live is changing. In accordance with it, the systems of education change from traditional to modern. The following changes occur: from content delivery to knowledge production, from transfer of knowledge from teacher to student towards encouragement of development and construction of knowledge, from courses and programs changing to the adaptation of the study environment, from the faculty professionalism to the quality of teaching and student learning and the early involvement of students in research work and projects. These occurring changes also affect the student and professor mobility. Here the word "mobility" represents more than the student exchange programs and the easier transitions from one's home university to a foreign one, but also the way professors conduct their classes.

With the development of certain software, a student's class attendance no longer represents an important factor, as they can now learn from distance using the mentioned software, taking the learning process one step further.

In order for said changes to occur, the use of e-learning and the development of new tools are almost mandatory.

7.11 UNIT- END ACTIVITIES

1. Describe the steps for constructing an achievement test in Computer Science
2. What are differences between Formative and Summative Evaluation?
3. Describe any five tools of evaluation?
4. Describe continuous and Comprehensive evaluation
5. Describe the steps for ON-line Examination
6. Describe the question types used for On=line examination
7. Describe the type of e-assessment in Computer Science.
8. Describe the steps for preparing diagnostic test?
9. What are the merits and demerits of e-assessment?

7.12 ANSWERS TO CHECK YOUR PROGRESS

1.Instruction	12.Achievement
2.Curriculum	13.Achievement
3.Formmative Evaluation	14.ON-LINE
4.Summative Evaluation	15.ON-LINE
5.CCE	16.ON-LINE
6.MMPI	17.Diagnostic
7.Calfornia Personality Test	18.Diagnostic Test
8.Allport-Vernon	19.e-testing
9.Rating Scale	20.Feed-back
10.Social Behaviour	21.Learning Objectives
11.achievement Test	

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