

UNIT 8 TECHNOLOGY IN/FOR EDUCATION

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Educational Technology (ET) as a Discipline

Educational Technology

Educational Technology is a systematic approach to designing and evaluating learning and teaching methods and methodologies. It includes informal technology, communication technology and instructional technology.

Origin of Educational Technology

The term 'Educational Technology' is used to describe the technological enhancement and advancement in the education sector. The subject deals with identifying the most suitable, appropriate and developed technology for serving the educational needs and purposes of the students. There has been a continuous shift with the usage of technology for improving the processes and products of education in different periods of human history and civilisation.

The process can be summarised as follows:

Early Period: In the early period, when writing was unknown, the method of teaching was used that of verbal presentation where students used to memorise. The oral teaching tradition was prevalent at that time, maintained by the ancient sages in the 'Gurukuls' of our country that may be cited as a testimony for the use of technology in the field of teaching and learning.

Medieval Period: The next breakthrough in the field of teaching and learning was the advent of writing as the means of learning and communication. Different writing technology started emerging like writing on the leaves and tree-trunks, engraving on the metals and rocks, and then the use of some type of paper and ink. This all provided a great impetus in the field of teaching and learning.

Modern Period: Then the production and use of the instructional material like chalks, blackboards, pictures, charts, models, maps, diagrams and other graphic materials came into existence and took its next leap in helping the cause of teaching and learning. The use of printing technology also came under this phase.

After Industrialisation: Then, with the development of industries, various scientific instruments, mass media and educational materials were used. This led to the usage of hardware and software such as radio, television, tape recorder, films, transparency, etc. in the field of education.

Present Scenario: Later on, the existence of system approach, micro-teaching, interaction analysis and computer assisted instruction added another dimension to the meaning and concept of an educational technology.

Meaning and Definitions of Educational Technology

It is the systematic application of science and technology which utilises all human and non-human resources to achieve educational objectives. It plays an effective role in communication between teachers and students. It provides technical guidance and solutions to the problems of education and efficiency in teaching and learning.

According to Shiv K Mitra, "Educational Technology can be conceived as a science of techniques and methods by which educational goals could be realised".

According to D Unwin, "Educational Technology is concerned with applications of modern skills and techniques to fulfill the requirements of education and training. This includes the facilitation of learning

by manipulation of media and methods, and the control of the environment in so far as this reflects on learning”.

According to I K Davies, “Educational Technology is concerned with the problems of an education and training context and it is characterised by the disciplined and systematic approach to an organisation of resources for learning”.

According to the Scottish Council for Educational Technology, “Educational Technology is a systematic approach for designing and evaluating learning and teaching methods and methodologies and to the application and exploitation of media and the current knowledge of communication techniques in an education, both formal and informal”.

Thus, the main role of Educational Technology is to enhance the teaching and learning process. Today's educational technology is the result of the integration of the technological devices with the newly explored psychological principles of learning and teaching,

Characteristics of Educational Technology

- It is the systematic application of scientific principles. It emphasises on the continuous development of methods and techniques for effective teaching,
- It uses audio-visual aids for direct teaching and learning,
- It includes informal technology, communication technology and instructional technology.
- It emphasises the continuous development of methods and techniques for effective teaching.
- It involves the use of equipment and electronics such as projectors, tape recorder, radio and television, harddrive and software.

Objectives of Educational Technology

- To identify an educational needs and aspirations of the community
- To gauge the aim, structure and strategies of an education.
- To develop a curriculum with correspondence to science, art and human values.
- To develop methods to improve the process of teaching and learning
- To identify the major issues with an educational system and means and ways to tackle those.
- To help the neglected section of the community to come under the preview of an education.
- To analyse educational needs of the students.
- To plan teaching strategies.
- To evaluate the effectiveness of the classroom teaching.
- To provide feedback to the teachers and students to bring any modification in the education process.

Significance of Educational Technology

- It sets the educational goals and objectives by identification of educational needs and aspirations of the community. .

- It helps in the development of curriculum by describing the ways and means for selecting a suitable learning experience.
- It tries to develop teaching and learning material like programmed learning material, computer assisted software and instructional material like programmed learning material, computer assisted learning material, mass media instructional material, etc.
- It describes the ways and means of discovering, selecting and developing tactics of teaching,
- It is also concerned with the development, selection and use of the appropriate audio-visual aids. .
- It considers education as a system, operating in a systematic and scientific way as it includes topics dealing with the theory and principles of system approach.
- It provides appropriate feedback to the learners as well as teachers for bringing necessary improvements. Educational technology discuss the means and ways for a suitable evaluation technique.

Scope of Educational Technology

Educational Technology is a wide concept. It not only includes the optimum utilisation of all human and non-human resources but also includes the below mentioned technologies

Information Technology It is the use of systems (computers and telecommunications) as a medium for achieving educational objectives.

Communication Technology It is the transfer of information that must be understood from one person to another.

Information and Communication Technology It is defined as the diverse set of technological tools and resources used to communicate and to create, disseminate store and to manage information.

Instructional Technology It implies a network of techniques or knowledge of instructions to accomplish certain set of learning objectives.

Educational Technology - as a Discipline

The term 'Educational Technology' involves many disciplines and demands specialisation and understanding of the planning, processing and products of education. The scope of educational technology is conceived by different individuals differently, for example, persons dealing with audio-visual aids, educational technology is confined to the use of audio-visual aids, while those who are working in mass media emphasise the importance of hardware, software and communication technology. Educational Technology exists in a fragmented way not only in India but also globally, there is a significant diversification in terms of objectives, topics and coverage of contents. However, a uniform concept and meaning of Educational Technology is being developed at the global level.

Let us discuss various disciplines of Educational Technology in detail-

Information Technology

Information Technology refers to the process of generating information with the use of machines and technologies. It includes gathering, organising, storing, publishing and using the information in the form of sound, picture, graphic text, number through the use of computers. It deals with the use of electronic computers and computer softwares to convert, store, protect, process, transmit and securely retrieve information.

In the field of teaching and learning, these new and emerging technologies challenge the traditional method of teaching. Information technology, while an important area of study in its own, is having a major impact across all the educational curriculum.

According to **Attaran**, "It is defined as the capabilities offered to organisations by computers, software applications, and telecommunications to deliver data, information and knowledge to individuals and processes".

According to the **Information Technology Association of America (ITAA)**, "It is defined as the study, design, development, implementation, support or management of computer-based information systems, particularly and computer hardware".

According to **Tan et al**, "It is defined as the information and communication technologies tools including computer network, software and hardware required for internet connection".

Communication Technology

It refers to the process of communicating information with the help of different equipment, programs and hardware and software systems.

It involves computer capabilities that facilitates exchange of information between an individual's. It plays an important role in education. It helps in immediate decision making and can be reached in any part of the world. In the process of teaching and learning, communicational technology has made many advances and it is emerging with new technologies and inventions.

According to **Oxford Dictionary**, "The technology associated with data communication refers to communication technology".

Information and Communication Technology

Information and Communication Technologies (ICT) are those technologies which enable us to create, collect, consolidate, communicate, manage and process information in multimedia and various digital formats by using telecommunication techniques. It consists of hardware, software, network media, computers, internet, broadcasting technologies, etc.

In the education sector, it has resulted in enormous benefits for students as well as teachers, the teaching-learning process has become more meaningful and productive. It has enhanced the whole teaching and learning environment. as

According to **UNESCO**, it is defined as "The scientific, technological and engineering disciplines and the management techniques used to transmit information with men and machines".

According to **Digital Video Technical Glossary**, "It is the computing and communications facilities and features that supports teaching, learning and a range of activities in education".

According to the **UK National Curriculum**, "It is used as the technology to handle information and aid communication". According to IBM Glossary, "It is the use of computer based information systems and communication system to process, transmit and store data and information",

According to **Bruer**, "It is defined as learners must rise above the rote, factual level to begin to think critically and creatively".

Origin and Growth of ICT

The process of collecting information and communicating it, is as old as human civilization itself. During early times, the information was stored in the memory and transmitted orally. The invention of paper and ink must be regarded as the first revolution in the field of Information and Communication Technology.

As it can be traced back to when humans started to use objects to communicate and deliver their message to one another.

So, the history of Information and Communication Technology can be divided into four phases-

Phase I (1450 BCE - 1450 CE)

- The pictograms and words carved in rocks were used as a means of communication during this time. e.g. Sumerian Pictogram (dated back 3100 BCE).
- Paper from papyrus plants, writing on the leaves and tree trunks was widely used.
- These papers were then combined to gather to make books and eventually, the storage place of these books came up as a library.
- China-Abacus was created in this period in 500 BC.
- Book Printed in 1438, by German inventor Johannes Gutenberg, movable type, the 'forty-two-line' Bible was created.

Phase II (1450 to 1840)

- This phase is marked as a link between the last and the first phase.
- The interest in automating and speeding up numerical calculations grew during this time.
- Pascaline in 1645 (calculator), by Blaise Pascal.
- Telegraph in 1837, by SFB Morse of USA.
- Computer concept (father of computer) in 1837, by Charles Babbage.

Phase III (1840-1940)

- The use of electricity for information handling and transfer emerged.
- Photography in 1849, by a Frenchman LGM Daguerre and an Englishman WHF Talbot.
- Telephone was invented in 1876, by Alexander Graham Bell of Scotland.
- Radio by G Marconi of Italy in 1895.

- Photostat in 1900, by Abbe Rene Graftin of France.
- Xerography in 1938, by Chester F Carlson of USA.
- Micrography in 1940, by JBD Ancer and Frenchman Rene Dagraan.
- Television in 1925, by J.L. Baird.

Phase IV (1940 - Present)

- This phase came up with the advent of electronic devices.
- Development of communication satellites (Sputnik was the first satellite launched by the USSR on 4th October, 1957) and Facsimile (Fax) technology in the 20th century.
- Laser technology in 1960, by Theodore Maiman of the USA. .
- Magnetic video cameras, video discs and computers developed in the 20th century.
- Electronic Numerical Integrator and Computer (ENIAC), electronic general purpose computer, developed in 1945.

The applications of Information and Communication Technology did not remain limited to certain fields of science and industry, but gradually broadened to other fields such as banking, management, offices, police and military establishment and education. As a result, we use it in teaching and learning and also in other forms of education. Thus, utilising its power as an effective medium for formal and non-formal education.

Information and Communication Technology in Education (Channels and Medium)

In education it is used as a combination of hardware and software, media and delivery systems.

Some of the medium through which an education can be transmitted are mentioned below-

- Audio-visual hardware (radio, television, slide projector, tape recorder and teaching machine). Digital video camera.
- Multimedia Personal Computer (PC), laptop and notebook.
- Application softwares such as word processing spreadsheets, powerpoint simulation and speed recognition.
- Multimedia projector (LCD or DLP) to communicate to larger groups.
- Local Area Network (LAN), Metropolitan Area Network (MAN) and Wide Area Network (WAN). Multimedia PC/laptop with video card and web camera or digital video camera,
- Computer database and data processing mechanism, CD ROM and DVD.
- Digital libraries.
- E-mail, internet and World Wide Web (WWW). Hypermedia and hypertext resources .
- Video text, tele-text, interactive video text, Interactive Video Disk (IVD) and Interactive Remote Instruction (IRI)
- Computer mediated conferencing video and audio conferencing
- Virtual classroom and virtual reality.

Advantages of ICT

Advantages of ICT are described below

For Students

- It offers student centered learning.
- Provides greater opportunity for personal communication and collaboration with teachers.
- Creates enthusiasm and motivation for learning.
- Easy access to quality educational material for learners.
- Provides online educational materials to distant learners.
- Provides learners with additional resources.
- It encourages independent and active learning.
- It satisfies their urge of curiosity, inventiveness, etc.
- It brings precision, speed and accuracy in receiving, transforming and communicating the required information. .
- Students become acquainted and trained for handling electronic appliances, software and techniques.

For Teachers

- Provides teachers with new sources of information and knowledge.
- It helps them in their task of teaching.
- They are able to acquire teaching material and techniques in the form of audio-visual material, equipment and electronic and telecommunication media.
- It provides them relief as their students use various ICT's resources for self-learning, for example, programmed learning material, self-learning modules, teaching machines and computers.

Disadvantages of ICT

- Most of the schools do not possess the required facility and infrastructure for the implementation of ICT as they are not in a position to afford the purchase, maintenance and other expenditure involved in its use.
- Various heads of institutions and teachers tend to ignore the applications and advantages of ICT's.
- The teachers offer fear of losing their dominance over the teaching and learning activities.
- The teachers want to stick with the broadcast model of teaching rather than the interactive model (use of ICT).
- Many students are not in favour of this transition due to fear of cumbersome processes involved in independent or interactive learning methods.
- There is a lack of knowledge, skills, attitude and interest on the part of teachers for the utilisation of ICT.
- The school authorities and administrative departments are also resistant to adopting ICT in school education.

Instructional Technology

It is defined as a sub-system of educational technology which helps the instructor or the learner himself as a part of his self-learning or auto instruction by determining the media, methods and material for the realisation of the stipulated instructional objectives in a given teaching and learning situation.

Thus, in simple terms, it is a type of technology meant for bringing improvement in the instructional process. The term 'instruction' stands for a certain type of command meant for getting some specific information, knowledge and understanding about a thing, system or process.

It makes the learner independent in his learning task and it provides an appropriate stimulus to the learner to produce certain types of responses for making learning more effective. It determines the media, methods and materials required for attaining instructional objectives.

According to **Smalding, L Lowther & Rusell**, "It is defined as the integration of teacher and student use and knowledge of tools and techniques to improve student learning".

Instructional Technology in Education (Channels and Medium)

- Attendance sheets
- Handouts and presentations
- Media/Technology (videos, podcasts, computer, software tools) .
- Graphic organisers .
- Posters
- Charts/Flip chart
- Instructional guides
- Checklists and case studies
- Quizzes
- Pictures, graphs, bulletin boards, diagrams
- Models, slides

Advantages of Instructional Technology

- It helps students to clarify their concepts and relationships.
- It encourages the application of knowledge and skills.
- It helps to stimulate the learner's interest.
- It engages learners with relevant content (visual, text, audio, etc).
- It brings out attention, relevance, confidence and satisfaction among students.

Limitations of Instructional Technology

- The use of technology requires skill, knowledge, coordination, management and organisational expertise which the educational bureaucracies have been unable to commit.
- Technology costs too much and part of this cost is the high level of expertise needed to apply it.
- The Hardware and Software have not yet reached the required level of perfection.
- High technology substitutes machines for humans.

It has following characteristics :-

Applications of ET in Education System

Educational Technology can be applied in the education system in the following manner-

Formal Education

Formal education is basically full time institutional activity that is uniform and subject oriented in a hierarchical structure. It is often carried for certificates, degrees or diplomas.

It has following characteristics :

- It gives technical and professional training.
- It works on full time education.
- It includes a variety of specialised programmes.
- It runs from primary schools to universities.
- It is a sequential graded education system.

Applications of Educational Technology in the Formal Education

In the present scenario, teachers are actively engaged in the usage of technology to display information, charts and to monitor and engage students. In order to be a part of this competitive world, students must have access to technology. Visual Technology Classrooms are equipped with smart boards. These interactive whiteboards allow different media (photos, documents, etc.) to be displayed by projector which enhances teaching and learning experience. It enables learners an opportunity to share and participate in the instructional process. It also gives access to online information

Computer Technology using computers in education brings significant change in teaching and learning process. Learners can access global libraries and the internet. It helps in huge and organised storage of information, quick communication, typing and publishing papers with help of word processing. Internet Technology The internet technology can provide an infinite amount of useful and relevant information. Learners can have easy access to quality education and fast updates of any information.

Technology Used

Projectors: A projector is an output device that takes images generated by a computer and reproduces them by projection onto a screen, wall or another surface. In a classroom, the projector is hooked up to the teacher's laptop and projects the screen from the laptop to the white board of the classroom. A word document, powerpoint presentation, educational videos can be projected.

Different types of technologies used are as follows-

SMART Technologies: SMART technologies are now being widely used for the teacher learner interaction in the classroom using computers. SMART boards is an interactive white board that allows the teacher to display any image from a laptop and digitally draws on that image as well. Graphs and tables are available templates in SMART boards. It can store lessons as well. It has immense benefits in the field of education.

Mimio Boards: They are similar to white boards. It allows the teachers to manipulate computer functions on the white board in front of the room. The teacher uses a special pen that acts like a mouse which helps him/her to search through websites, graphs and other lessons.

Classroom PCs: Some learners are lucky to have individual PCs in the classroom. If every student has his/her own laptop, a teacher can allow them to research and explore on their own. PCs can store student's work efficiently rather than carrying bulky encyclopedias and dictionaries, they can access the internet on their own. A paperless world in the classroom can be organised as well as environmental friendly.

SMART Classroom: Smart classrooms are technology enhanced classrooms that foster opportunities for teaching and learning by integrating learning technology such as computers, softwares, audience responses, assistive listening devices, networking and audio-visual capabilities.

Non-Formal Education

Non-formal education is outside the scope of the formal system for providing education. It includes a flexible curriculum, methodology which adapts according to the needs and interests of the students. Time is not a constraint here. It includes two processes, namely 'open learning and distance learning'. It has following characteristics

- It is flexible and works according to the student's choice.
- It is fully learner oriented.
- It is non-authoritarian.
- It is built on learner-participation.
- It enhances human potential.

Applications of Educational Technology in the Non-Formal Education

Non-formal education includes open and distance learning where both give a broad access to education. In this type of education, either the lessons are broadcast or lessons are conducted by correspondence without the student needing to attend a school or college. The usage of an educational technology, thus, holds an immense importance in the effective working of the non-formal educational system.

Computer Assisted Learning (CAL) It aims to provide interactive instruction with a wide range of computer-based packages. CAL runs from a CD or floppy disk or over a local network, so the constraint of the internet may not apply. It offers a more advanced, interactive, multimedia learning experience. CAL has been an integral part of the curriculum till date.

Internet Technologies The arrival of the internet has made communication between machines easier. E-mail and the world wide web are the forerunner. Web pages provide authoring access to anybody. Internet technology covers a wide range of resources such as video conferencing, virtual learning environments and e-learning technologies, etc.

Technology Used

Digital Learning Resources: It means placing word documents or powerpoint presentations on the web for students to download and print.

Computer Mediated Communication (CMC) It is defined as any means in which individuals can talk to each other.

It can be of two types-

1. **Synchronous:** It is a mode of online delivery where exchange takes place in 'real time'. It requires a timetable to be organised. It includes telephone, video conferencing, web conferencing, audio conferencing, internet chat.
2. **Asynchronous:** In this mode, messages are posted up at any time and read and responded to, by others at a time which suits them. It includes audio cassette, e-mail, message board forums, print materials, voice mail/fax, videocassette, broadcast video, radio, CD-ROM.

Computer Assisted Assessment (CAA) It is the process of utilising computing technologies for accessing student's work. It includes accessing and providing feedback on the teacher's lesson. It is an opportunity to provide a timely response to student progress. The use of CAA for self-diagnosis and self assessment is quick to set up and if it is used wisely, it can give valuable feedback.

Virtual Learning Environment (VLE) It is a set of teaching and learning tools designed to enhance a student's learning experience with the use of computers and the internet. It includes curricular mapping, student tracking, online support for both teacher and student, electronic communication and internet links. The users of VLE are assigned a teacher ID or a student ID

e-learning It refers to a course, program or degree delivered online. The term 'e-learning' is also used to describe 'distance learning', where a learner enjoys an interactive session where he/she can communicate with teachers, professors or students in the class. It can also be delivered live. E-learning has become a successful method of training and education.

Informal Education

Informal education covers every aspect of learning that doesn't take place in a normal school setting. It is truly a lifelong process whereby every individual acquires attitudes, values and skills and knowledge from daily experiences or resources in his/her environment i.e. family, neighbours, from work and play, from technology, etc.

- It is determined by an individual.
- There is no existence of a mentor, coach or teacher.
- It is an unstructured activity.
- The learner learns from real-world experiences.
- Its objectives are more meaningful.
- It is a lifelong process.

Applications of Educational Technology in the Informal Education

The usage of technology in the informal education system has emerged as very crucial. If a learner wants to seek education outside of a structured curriculum, he/she can attain the knowledge through various sources like listening to radio, broadcasting or watching TV programmes on an educational theme. Students can also download e-books or visits educational video channel or download applications mobile. Learners can also enroll in various online courses and communicate with other learners.

Technology Used

- Wikis, blogs and forums
- World Wide Web
- Applications
- Learning and knowledge portals
- Videos and podcasts
- e-books
- Social network

Inclusive Education

It is defined as “a learning environment that full personal, academic and professional development of all promotes the learners irrespective of race, class, colour, gender, disability, sexual preference, learning styles and language”. All students attend and are welcomed by their neighbourhood schools to learn, contribute and participate in all aspects of the life of school.

It has following characteristics

- It provides the right to education for all.
- The student's views are listened to and taken seriously.
- It develops social consciousness among students.
- It demands the participation of all students, teachers, parents and community members.
- It helps in restructuring the culture, policies and practices in schools to respond to the diversity of learners within their locality.

Applications of Educational Technology in the Inclusive Education

Technology is present in every other sphere of an educational system, it has also emerged greatly in the field of special education. Technology is a growing epidemic in the classroom and it helps students with disabilities to work more quickly, easily and independently. Students in special education use i-pads to learn concepts such as counting and spelling. The technology helps students with visual problems to see the text easily.

Alternative Input Devices It allows students with disabilities to use computer and other technology easily. It includes touch screens, modified keyboards, joysticks and on-screen keyboards, etc.

Speech to Text Options It provides a learning advantage for students who have mobility problems, or those who are | blind. It allows students to speak their thoughts without typing and even navigate the internet. It also consists of let them know the potential errors. talk-back' option to let them know the potential errors.

Sensory Enhancers Some children with disabilities may need to learn differently than their peers. Instead of learning ABC and numbers, a child with language hindrance may benefit from bright pictures or colors to learn new concepts. It includes voice analysers, speech synthesisers, etc.

Screen Readers It reads out the text on the screen loudly. A student who is blind or struggling to see what is on screen can benefit from the audio interface screen readers provides.

Technology Used

- I-pads
- Touch screens
- Computers
- Scanners
- Wand and joysticks
- Sip and puff system
- Smart Boards
- Digital book
- Voice recognition software
- Braille embossers and refreshable Braille displays
- Screen magnifiers
- Text To Speech (TTS)
- Alternative keyboards
- Light signals

Learning Theories

Learning theories explain how individuals acquire, organise and deploy skills and knowledge.

Three basic categories of learning theories are-

- Behaviourist
- Constructive
- Cognitive

Behaviourist Learning Theory

According to **Ertmer & Newby**, "Behaviourism focuses on the importance of consequences of the performances and contends that responses that are followed by reinforcement are more likely to occur in the future."

According to **Good & Brophy**, "The theory of Behaviourism concentrates on the study of overt behaviours that can be observed and measured".

It is a learning process which is a conditioned response to a stimulus. It emphasises changes in behaviour that results from stimulus response associations made by the learner.

Thus, Behaviourism uses a system in which the instructor provides a stimulus (material to be learned) and learners provide a response (evidence of learning). The knowledge exists outside the learner, eg. take the maths equation $8+8=?$ The learner replies 16. The equation is the stimulus, and the answer is the response.

BF Skinner introduced the 'Theory of Operant Conditioning' in Behaviourism Learning theory. It is a method of learning that occurs through rewards and punishments for behaviour.

BF Skinner

The eminent **psychologist BF Skinner** propounded the theory of operant conditioning. According to this theory, learning is based on the consequences of the responses. He emphasises on the stimulus response (S-R) behaviour.

Skinner highlighted that if an individual behaves in some way, does something or in technical sense 'Operates' on an environment, in return, the environment also responds to such behaviour by rewarding or punishing it.

Skinner's research was centered around the Skinner box. A Skinner box is an experiment space that contains one or more operands, such as a lever, that may be pressed by a cat. The box also contained various sources of stimuli. When a particular S-R pattern is reinforced (rewarded), an individual is conditioned to respond.

Principles and Mechanisms of Skinner's Operant Conditioning

Positive Reinforcement Behaviours that are positively reinforced will reoccur, intermittent reinforcement Vs particularly effective. For example, a verbal praise, a good grade or feeling of satisfaction.

Negative Reinforcement Responses that allow escape from painful or undesirable situations are likely to be repeated. A negative reinforcement is any stimulus that results in the increased frequency of a response when it is withdrawn. It results in reduced response.

Punishment The responses that bring painful or undesirable consequences will be suppressed, but may reappear if reinforcement contingencies change.

Non-Reinforcement The responses that are not reinforced are not likely to be repeated.

So, the operant teaching model focuses on the modification of one's behaviour by making use of the principles of operant conditioning.

It aims to control and manage the learning environment in such a way as to provide proper reinforcement for the shaping of a new or desired behaviour.

Cognitive Learning Theories

According to **Shelly**, "The cognitive theory's, activities like thinking and remembering seem like a behaviour, thus providing an avenue to use behaviour analysis to measure their effect on learning".

According to Ertmer & Newby, "Acquisition of knowledge is processed through mental structure changes, rather than through responses and stimuli. The mind is used as a reference tool to process past information and to create new knowledge."

Thus, they stress on the acquisition of knowledge and skills, processing of information and beliefs. Here, cognitivist educators try to transfer new knowledge to students and help them to organise, integrate, and retrieve it, knowledge so that it exists outside the learner. It is very useful when learners face introductory courses or courses in which a variety of learning styles can be accommodated. Major theorists associated with Cognitive Learning theory are Jean Piaget, David Ausubel and J Bruner.

Jean Piaget

The cognitive development model is the outcome of the Philosophy and views expressed by Jean Piaget, a Swiss psychologist, about the intellectual development of children right from the period of their birth. Given below are some essential theoretical notations and ideas related to Piaget's theory

- One's cognitive development at any stage of his/her life is the joint product of his hereditary potential and interaction with his/her physical and social environment.
- The key to a child's cognitive development lies in his constant interaction with the physical and social environment. The process of such interaction is carried through assimilation (incorporation of experiences) and accommodation (modification of existing experiences).
- The child's cognitive structure and its functioning, always remains in a state of constant change and development as a result of the process of assimilation and accommodation for bringing desired equilibration between himself and the environment.

Piaget advocated stage-linked characteristics of cognitive development. Therefore, any scheme of education or teaching learning process must be planned well in time with the nature of the cognitive development of the children belonging to a particular age and grade level. Thus, Cognitive Development Model stands for organising the teaching-learning environment and activities for development of stage-relevant cognitive abilities and learning experiences to the children of a particular age group and testing the nature of their cognitive development.

Piaget model involves around four stages of intellectual development as shown below :

Piaget's Stages of Cognitive Development

Stages	Nature of Cognitive Development
Sensory Motor Stage (0-2 years)	<ul style="list-style-type: none"> (i) Thinking is based on sensory and motor exploration. (ii) Child learns that he is separate from his environment. (iii) He acquires the concept of object durability.
Pre-operational Stage (2-7 years)	<ul style="list-style-type: none"> (i) Use of language and symbols to build thought process. (ii) Mode of thinking is illogical, imaginative and intuitive.
Stages	Nature of Cognitive Development
Concrete Operational Stage (7-11 years)	<ul style="list-style-type: none"> (i) Child is able to recognise concepts of number, classification, conservation, and reversibility. (ii) Logical thinking started emerging using inductive and deductive approaches but is able to do so only in terms of concrete objects and events.
Formal Operational Stage (11-16 years)	<ul style="list-style-type: none"> (i) Child is able to think abstractly, deals with imaginary and hypothetical problems. (ii) He acquires the ability of scientific thinking and problem solving and tries to reach at the peak of his cognitive development.

David Ausubel

David Ausubel, psychologist, gave the 'meaningful learning theory'. He was influenced by the work of Piaget. His theory was concerned with how students learn a large amount of meaningful material from verbal/textual presentations. Learning, under this theory, is based on the representation, subordinate and combinational process that occur during the learning process. A primary process in meaningful learning is a formation in which new material is related to relevant ideas in the existing cognitive structure on the basis of previous knowledge. It is the result of linking new information in the learner's own cognitive structure.

Ausubel proposed the following four processes-

1. **Derivative Subsumption:** Situation in which the new information that a pupil learns is an instance or example of a concept that they have already learned.
2. **Correlative Subsumption:** It enriches the higher-level concept.
3. **Superordinate Learning:** A lot of examples of a concept are known but the concept is unknown until it is taught to pupils.
4. **Combinational Learning:** A process in which a new idea is derived from another idea on the basis of previous knowledge. Relevance to a student's cognitive structures happens when we pay attention to early knowledge of the concepts that preceded the concept to be learned. For Ausubel, meaningful learning is a process that is related to new information relevant to the concepts contained in a person's cognitive structure. It enables students to associate their early knowledge with the new knowledge which will allow students to build knowledge in discovering learning activities.

Jerome Bruner Theory

J. Bruner was a cognitive and educational psychologist. He believes that classroom learning should take place inductively (specific to generalisation). He argued that schools waste time to match the complexity of subject material to a child's cognitive stage of development. He believed that complex ideas should first be taught at a simplified level and then the level of the subject should increase gradually. The modes of representations of Bruner theory are

Enactive Stage (Birth to 3 years)

The child learns through movement or action. It is also known as the concrete stage. It involves encoding action based information and storing it in memory. It can be in the form of muscle memory where a body might remember the action of shaking a rattle. Example, usage of coin or paper for maths education.

Iconic Stage (3 to 8 years)

This stage is also known as "pictorial stage" or "photographic memory". It involves images or other visuals to retain memory. It is represented by the image of objects on paper or to picture them in one's head. e.g. use of shapes, diagrams and graphs.

Symbolic Stage (From 8 years)

Under this stage, the child learns through abstract symbols. It takes the images from the second stage and represents them using words and symbols. It helps students to recognise information in the mind by relating concepts together. Example, variables (x and y), mathematical symbols (+, -, /) or words (addition, subtraction) and use of language and words.

Constructive Learning Theories

According to **Moscolol & Fischer**, "Constructivism is the philosophical and scientific position that knowledge arises through a process of active construction".

According to **Brooks**, "As long as there were people asking each other questions, we have had constructivist classrooms. Constructivism, the study of learning, is about how we all make sense to our world, and that call hasn't changed"

The learning under this theory occurs through interaction. The information is received through the guidance of a peer or instructor and the learner creates knowledge through the exchange of the knowledge with his peers.

Thus, constructivism helps learners to build knowledge by integrating prior learning, context, and experiences. Knowledge exists within the learner. The Lev Vygotsky, a psychologist, proposed the '**Socio-cultural theory**', under Constructive Learning theory',

Lev Vygotsky's Socio-Cultural Theory

The Social Cultural theory of **Lev Vygotsky** was made on the belief that parents, care givers, peers and the culture at large were responsible for developing high order skills.

He also suggested that human development is a result of interaction between individuals and society. Through this interaction, children learn from parents and teachers.

Vygotsky's theory emphasises an active role of students in the learning process.

The four basic principles underlying the Vygotskyian framework are-

- (i) Language plays an important role in mental development.
- (ii) Development cannot be separated from its social concept.
- iii) Learning can lead to development.
- (iv) Children construct their knowledge.

According to **Vygotsky**, "The zone of proximity is the distance between the actual development level as determined by independent problem-solving and the level of potential development as determined through problem solving under guidance or in collaboration with more capable peers".

The zone of proximity development contains two features-

- I. **Scaffolding:** It requires that an instructor shows by example how to solve a problem, while controlling the learning environment, so that students can take things step by step by expanding their base of knowledge without excessive frustration.
- II. **Reciprocal Teaching:** It provides an environment of open dialogue between student and teacher which goes beyond a simple question and answer session.

He believed that the child can gain knowledge through the help of others. However, the knowledge must be appropriate for the child's level of comprehension. Anything that is too complicated for the child to learn or that is not in their Zone of Proximity Development (ZPD) cannot be learnt until there is a shift in the ZPD.

He emphasised on the role of teacher in constructive development, and the need to have support from More Knowledgeable than Others or MKO (coach, teacher). The ZPD differentiates between a learner's current development and their potential development being taught from MKO.

Relationship Between Learning Theories and Instructional Strategies

'Learning theories' are described as a collection of learning theory and models and 'instructional design', is a collection of instructional strategies that are designed with the help of learning theories.

Influential behaviourists like Skinner and cognitivist like Piaget, Ausubel and Bruner and constructivists like Vygotsky, have designed learning theories as a means to educate learners. The applications of these theories were presented in the 1950s through the advent of Skinner's teaching machines and many more. The machines were designed, so that the learner can complete each task in order to move forward. The machines were inventive and based on obtaining a positive response from the learner in the form of behaviour.

These machines led to the development of programmed instructions which follows a systematic approach to problem solving. It was marked as a birth of system design or instructional design approach to an education. Various lessons like guides, tasks, practice and feedback, contents are laid out for students.

The learning results in the development of a skill and practising that skill will result in a response to a stimulus. The focus of learning theories resides in the use of reinforcement to drive learning, instructional strategies as trained learners to complete instructional objectives. The teaching machines and programmed instructions are small contributions to the field of education but have paved the way for instructional designers to shape the learning environment to result in more effective strategies. Many instructional strategies include the use of feedback to the learner as it helps in the development of positive behaviour that result from instruction.

With the advent of Cognitive Learning Theory, instructional design expanded its scope of practice to include solutions to focus on the learner in the design process. It uses the information about the learners as well as the environment to develop instructional solutions. The instructional strategy uses various assessment tools to test the transferred acquired knowledge of the learner. Instructional strategy shifted in the presence of cognitivism and includes a more system like design approach with the focus on learners.

Constructive Theory has expanded in the way that instructional solutions can be developed. New opportunities for learning have been generated with the addition of social aspects in learning. Collective learning groups and the use of peer review are widely used in the learning process. Thus, learners can interpret various learning theories to improve their understanding. Instructional strategies have influenced learning theories like behaviourism, cognitivism and constructivism which acts as a pillar of successful approaches. As each of these theories include different learning strategies, either by

behavioural response or knowledge acquisition, they have largely contributed to the learning processes and are responsible for how the field of instructional strategy has evolved over time.

Let us discuss the methods necessary for learning and effective instructional strategies in the classroom-

Small Group Methods

For certain objectives, small-group methods are the techniques of choice. In other instances, they are valuable options that can provide an educational system with needed flexibility. When used properly, the methods are invaluable for increasing student motivation through greater involvement and participation. Under certain conditions, they even make it possible to ease the loads of overburdened instructors by reducing the time required to prepare formal presentations.

In general, it is feasible to use small-group methods in courses to-

- Increase understanding and grasp of course content.
- Enhance motivation and generate greater student involvement.
- Develop positive attitudes toward later use of presented material. .
- Develop problem-solving skills specific to the course content.
- Provide practice in the application of concepts and information to practical problems.
- Generate ideas among students concerning ways of applying acquired knowledge.
- Develop student commitment to recommended ways of handling problems. .
- Emphasise an important issue. .
- Proceed with instruction when content experts are scarce or not available.

Large Group Teaching

Large group teaching if carefully organised and implemented can cause more active learning in students, With a large group setting, active learning can be encouraged in

- Individual or pairs of students in a large lecture
- Groups of students in a large group.

One technique for managing large classes is to sub-divide the class into more manageable groups, using peer-assisted mentoring. In peer-assisted learning, there is an educational gain for both the mentoring students and the mentees, both groups of students are given modular credit for their respective roles in the educational arrangement.

The examples of the use of technology in large class settings to improve engagement and student assessment are-student response systems and virtual laboratories. The student response systems are educational technologies most often used for the purpose of making face-to-face lectures interactive by engaging students in real-time activities. On the other hand, virtual laboratories can go some way to bridge the gap between the demand and capacity to deliver laboratory-based practicals. It enhances the educational experience of students.

Formal Group Learning

Formal learning groups last from one class period to several weeks, whatever it takes to complete a specific task or assignment. The purpose is to use the group to accomplish shared goals to capitalize on different talents and knowledge of the group, and to maximize the learning of everyone in the group.

Examples of formal learning groups are

- **Group Projects** Assignments complex enough or large and time sensitive enough to require the effort of a group. Some work may be done outside of class.
- **Collaborative Learning** Classroom activities, projects or assignments designed so that the group succeeds when every individual succeeds.

Non-Formal Group Learning

It is free from rigidity with regard to curriculum, learning materials, methodology, venue, duration or the length an individual takes to complete a particular instructional session. There are a number of methods and instructional media found effective in non-formal education which are projected media, display boards, graphic media, multimedia mix, etc.

Systems Approach to Instructional design

Let us understand what the System approach and its application to instructional design.

Systems Approach

The term System approach has been formed by two words system and approach. By system is meant the entire or wholeness, in which all elements, factors, organs or components are mutually related, knit together and self-controlled. The System approach believes in the entire. It is a method to arrive at solutions to problems and it helps to carry forward and develop the teaching and training system as per new changes. The concept of System approach is a part of the field of education to manage its affairs. It has been introduced in education to improve, manage and control its process and products.

It indicates systematic thinking, step by step problem-solving and considering many variables of a problem as interacting with each other. In other words, studying the phenomenon or process as a whole and not in bits and pieces. In this approach, a problem is taken into account in its totality and attempts are made to solve it, in the context of the

- Predetermined objectives,
- functioning of its interrelated parts and the whole system under the given environmental constraints.

It advocates the exercise of reasonable control over the organisation, process and product of a system's meaning and creates a reasonable balance among input, process, output and the environment constraints for achieving the specified objectives. If a system meets the requirements of the system's

objectives, it is maintained. If it does not, then it is modified. Thus, the term System approach, refers to the use of a system in identification, execution and evaluation of goals in any given situation,

In general, the System approach includes the following steps -

- Analysis of the given situation.
- Setting up relevant objectives or goals. .
- Devising the most appropriate ways and means to achieve the specified objectives or goals, keeping in mind various factors, like resources, human finance, machinery, environment.
- Devising monitoring tools to evaluate the achievement of specified goals and thus, the effectiveness of the system.
- Planning alternative solutions, in case of failure of the solution.

Definitions of System Approach

According to Twelkier, "System approach is a management tool that allows individuals to examine all aspects of the organisation, to inter-relate the effects of one set of decisions to another and to optimally use all the resources at hand, to solve the problem".

According to Keshow and Michean, "System approach is one of the techniques which aims at finding the most efficient and economically intelligent methods for solving the problems of education, scientifically".

Importance of System Approach in Education

- Framework for planning, decision-making, controlling and problem-solving.
- Throws light on the dynamic nature of management.
- Provides a unified focus to institutional efforts.
- Helps to look at institutions as a whole and not as a part.
- Helps the manager to identify the critical subsystems and their interaction with each other.
- Helps in improving institutions.
- Helps in bringing efficiency in school's administration and management. .
- Helps in systematic educational planning. It consists of the following process:
- Maximum utilisation of resources. Analysing the task.
- Helps in improving examination and evaluation systems.
- Maintaining, controlling and improving the guidance services.
- Designing, controlling and improving non-formal and adult education systems.
- Helps in improving the quality of education.
- Helps in improving the teacher's training programmes, in-service as well as pre-service.

Instructional Design

An instructional designer is somewhat like an engineer. It is the process by which educational products are designed, developed and delivered. These products include online courses, manuals, tutorials, etc. So, instructional design is the analysis of learning needs and then systematic development of instruction. Instructional technology is often used by instructional designers.

According to **Smith, Patricia L and Tillman J** "The term instructional design refers to the systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources and evaluation",

Thus, it is the entire process of analysis of educational needs and goals to meet those objectives. It includes development of a delivery system and instructional materials and activities to meet the learning needs.

Systems Approach to Instructional Design

System Approach to instructional design is known as common sense by designing a systematic way of analysing a problem and solving it. It helps in understanding, controlling and improving the structure and functioning of the system, to fully realise the instructional objectives. Jalaluddin in 1981, marked six major phases in the approach to the instructional design as mentioned below, They are:

Formation of Objectives It includes the specification of instructional objectives in terms of the expected outcomes. ! Pre-Assessment of Student's Entering Behaviour It includes the assessment of student's initial performance, with the help of certain criterion.

Designing and Development of the System In this process, an instructional system is developed, with the help of planned and designed inputs.

- Analysing the task.
- Devising teaching strategies.
- Selection of media and material.
- Selection and organisation of appropriate contents (learning experiences).
- Assigning roles to the elements involved in the instructional system. .

Operation or Implementation Phase Under this process, the actual operation or implementation of the instructional system takes place. All the elements of the instructional systems are integrated, for achieving the desired instructional objectives. Evaluation of Outcomes The students' achievement is evaluated according to the stipulated instructional objectives, on the basis of the post test scores. Improvement of the System This process deals with the improvement of the system, on the basis of feedback from evaluation results. It aims to improve effectiveness as per the specified objectives.

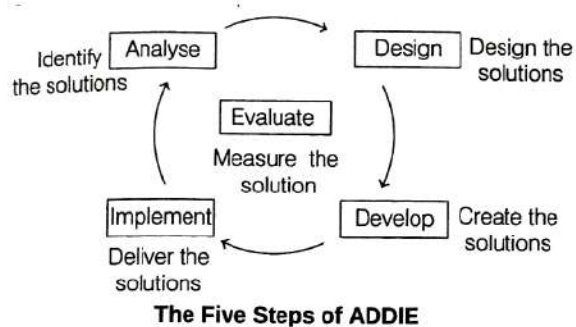
Thus, the goals of the education system can be obtained through the technique of System approach in the most economical and scientific way. It provides the scope to improve and modify the system. Thus, a teacher may be able to develop a suitable instructional design based on the feedback provided by the System approach.

Models of Development of Instructional Design

procedural and conceptual models based on the theory and practice of instructional design, which helps to give structure or meaning to a problem. They are Below are

ADDIE

It is a framework used by training developers and instructional designers to create instruction. It represents a guideline for building effective training and performance support tools in five ways. The five phases of ADDIE are analyse, design, development, implementation and evaluation. They, altogether, provide the framework for the development of training courses in a systematic and cost effective manner.



They can be explained as below-

Analyse

It establishes the instructional goals, objectives and targeted outcomes. It also makes sure that there is no duplication of knowledge and repetition, by identifying the existing knowledge and skills of the targeted audience. At the end of this phase, a training plan with training needs analysis, should be completed for the design phase.

Design

The focus of this phase is on learning objectives, the content framework and the structure.

This phase determines -

- Duration
- Delivery methods .
- Content's elements .
- Assessment type and tools
- Exercises and activities
- Media and visuals .

Develop

In this phase, course content is developed using the plans and guidelines from the design phase. All needed assets should be created (audio, video) to support the learning delivery. The programmers should integrate and develop technologies, in the course of delivery.

Implement

This is the delivery phase, where learning services are delivered to the learners. Highly competent trainers can make poorly designed programs, work well and well-designed programs, work great.

Evaluate

The aim of this phase is to check, whether the learning goals have been met or not. It establishes the required modification, to increase the efficiency and success rate of the learning program. A feedback mechanism ensures that the course has met the learning needs of the students and they have been presented with effective and necessary tools and aids.

ASSURE

It was developed by Robert Heinich, Michael Molenda and James D Russell. This model of instructional design, focuses on planning and conducting lessons, that aims to integrate media and technology, while focusing on the learner's needs. Thus, it is a systematic approach of developing lesson's plans that help teachers to organise instructional procedures and do an authentic assessment of student's learning

Assure Model contains six steps and they are-

A—Analyse learners

S—State objectives

S—Select methods, media and materials

U—Utilise media and materials

R-Require learner's participation

E-Evaluate and revise

Analyse Learners

- Identify the learners, so that you may select the best medium to meet the objectives.
- Analyse the audience, in of general characteristics (grade, age, sex, socio-economic level, etc.) and specific characteristics (knowledge, skills and attitude). terms
- Identify the learning style of the students (verbal, logical, visual, musical, structured).

State Objectives

- The next step is to state the objectives, as specifically as possible.
- Include conditions and degree of acceptable performance.
- The objectives may be derived from an assessment or course syllabus, stated in a text book, taken from curriculum, guide or developed by an instructor.
- Objectives are the learning outcomes, i.e. what will the students get out of the lesson?

The ABCDs of writing objectives are :

A - Audience Name-The audience of learners, for whom the objective is intended.

B - Behaviour Specify-The behaviour or capability to be learned.

C - Conditions-State the conditions, under which the performance would be observed,

D - Degree-Specify the degree, to which the new skill must be mastered

Select Methods, Media and Materials .

A systematic plan for deciding an appropriate media must be selected.

It consists of two steps and they are-

- Choosing an appropriate media format
- Selecting, modifying and designing the specific materials, within that format.

Utilise Media and Materials

Utilisation procedures must be followed, in order to get maximum learning impact.

Following steps are included, in efficiently utilizing of media and materials-

- Preview the material
- Practice the presentation
- Prepare an environment
- Prepare an audience and present

Require Learner's Participation

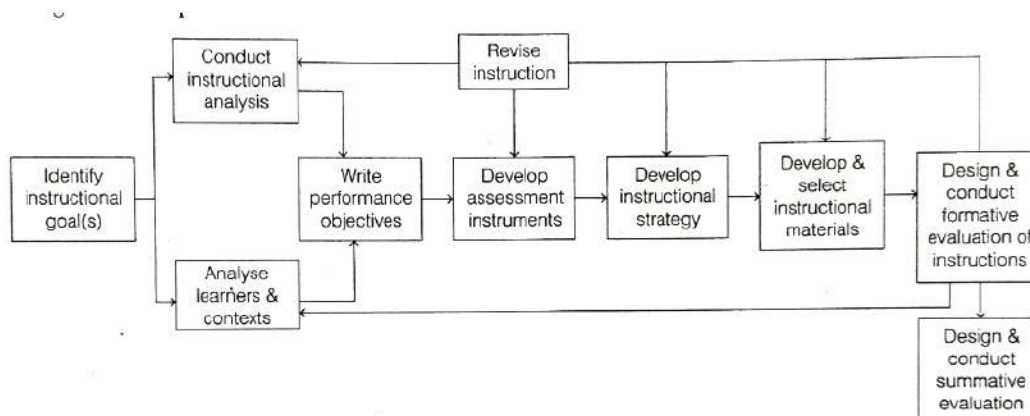
- It provides an opportunity for the learner to test the lessons being taught.
- Participation of the learners in the learning process enhances learning.

Evaluate and Revise

- The final step of the ASSURE model is to sit back and look at the results of your evaluation data gathering.
- The purpose of evaluation is to measure student's achievements, to evaluate media, methods and instructional process.
- In case of any shortcomings, the faulty part of the plan is revised .

Dick and Carey Model

This model is based on the Educationist Model of breaking instruction into smaller components. Specifically instruction is targeted on the skills and knowledge to be taught and appropriate conditions for the learning of outcomes. Its goal is to improve the instructor.



The ten steps in this model represent a set of procedures, which is referred to as System Approach because it is made of interacting components. All the components are carefully linked.

This model is divided into six phases and they are :

Design Identify instructional goals and conduct Instructional Analysis.

Analysis Analyse learners and contexts

Summative Evaluation Design and conduct summative evaluation.

Revision Revise instruction.

Formative Assessment Design and conduct formative evaluation of instruction

Development: Write performance objectives, develop assessment instruments, develop instructional strategies, develop and select instructional materials.

First Two Phases: Design and Analysis

Identify Instructional Goals Decide the goal of the instruction and what will the learners be able to perform, after they complete the training program. The goals can be derived from needs assessment, a list of smaller goals, practical experience with learning or analysis of job performance.

Conduct Instructional Analysis This process deals with the skills required by the students, to achieve desirable goals. It questions what step by step skills do students need to achieve instructional goals.

Analyse Learners and Contexts Analyze the instructional goals of the learners, the contexts in which they will learn the skills and where they will use the knowledge. Also look for the learner's current skills, preferences, attitude and finally determine instructional settings.

Next Phase: Development

Write Performance Objectives Describe the skill or behaviour conditions that prevail, while carrying out tasks and the criteria to evaluate performance.

Develop Assessment Instruments Based the objectives described, assessments are developed that are parallel to the learner's ability to perform. Examples of testing and measurement instruments are criterion referenced tests, behaviour tests, pre-tests, post tests, practice tests, on etc.

Develop Instructional Strategy Identify the strategy to be used while delivering instruction, to achieve the terminal objectives. The strategy that will emphasise components, to foster student's learning include pre-instructional activities, presentation of content, learner's participation assessment and follow through activities.

Develop and Select Instructional Material Instructional strategy is used to produce the instruction. It includes guidance for learners, instructional materials and assessments. Some of the examples are teaching guides, transparencies, computer applications, video-tapes, web pages, etc.

Final Phases: Formative Assessment, Revision and Summative Evaluation

Design and Conduct Formative Evaluation of Instruction: After the completion of a draft of the instruction, a series of evaluations are conducted to collect data, to identify the need to improve instruction.

The three types of **formative evaluation** are-

- **one to one evaluation,**
- **small group evaluation and**
- **field-trial evaluation**

Revise Instruction: Data from the formative evaluation are summarised and interpreted to identify difficulties experienced by learners in achieving the objectives and then specify the deficiencies in the instruction. It is used to re-examine the validity of Instructional Analysis and the assumptions about the entry behaviours and characteristics of learners. The instructional strategy is reviewed and finally, all these considerations are incorporated into revisions of the instruction, to make it a more effective instructional tool.

Design and Conduct Summative Evaluation: It is an evaluation of the absolute value or worth of the instructional methods. It occurs only after the instruction has been formatively evaluated and sufficiently revised. It involves an independent evaluator.

Mason's Model

Charlotte Mason's Philosophy of Education has persisted for over a century and has regained popularity, especially among a subset of home schooling families. She believed that education should involve the whole person, not just the mind. According to Mason, education is an atmosphere, a discipline, a life". She advocated a high-quality, interesting curriculum for all children, not merely to educate them, but also to guide them in the development of character and cultivate in them a lifelong love of learning.

In terms of homeschooling, the **Charlotte Mason's** approach translates to

- the abundant use of narrative literature
- plenty of time spent in outdoor's exploring
- the development of an appreciation for art, music and nature.

Charlotte Mason's teaching method consists of activities and attitude that help a child to learn self-discipline as well as academic subjects.

The specific steps to her method includes-

(i) **Narration** An activity that consists of the child telling back a story she has heard or read. It is done orally, when the child is young and as she grows older, she begins to write out her narrations. This learning is both efficient and effective in terms of long-term retention.

(ii) **Picture Study** Teacher shows students a picture and gives the student a period of time in which to study it. When the time is up the picture is turned over and students tell back from memory what they remember about the picture.

iii) **Nature Study** A study of living science, with an observation of things seen on nature walk. This type of study is accessible to children both young and old. It relates them to the physical world while developing their powers of observation and creating in them a lifelong appreciation for the flora and fauna in the world around them.

(iv) **Living Books** Books written in an alive, engaging way by an author who had a passion for the subject. This would be in contrast to textbooks, which are often created by committees to achieve government's set school standards.

(v) **Scheduled Free Time** Mason insisted that children need “**free time**” in which to pursue their interests, read, reflect and simply play. It helps children to pursue self-directed learning with their teacher close at hand to provide direction, stimulation and support.

Characteristics of Mason's Model

Short Lessons **Charlotte Mason** recommended starting out with short lessons and slowly increasing them as children get older. The goal is to train the child to focus fully on their work, but only for the amount of time they are developmentally capable of short lessons means that more subjects can be incorporated.

Habits Charlotte believed that the development of good habits within a child provides the foundation for early education.

Living Books Living books are the opposite of textbooks quality literature. They present inspiring stories that engage the minds of children and adults, like providing characters our children can look up to and emulate.

Dictation Dictation exercises, introduce and reinforce spelling and grammar concepts. Formal grammar study is usually delayed until age 10 or 11 in a Charlotte Mason's education.

Benefits of Mason's Education

- Keeping students engaged with their learning by lessons short and manageable.
- Installing love for literature through the use of living books.
- Teaching a child to express himself/herself clearly through narration practice.
- Reinforcing spelling and grammar concepts through dictation exercises..
- Exposing students to fine arts particularly art and music.
- Infusing a student's life with an appreciation of the natural world.

Gagne's Nine events of instruction

Robert Gagne was an educational psychologist, who created a nine step process called the Events of Instruction. It helps trainers, educators and instructional designers to structure their training sessions. It is a systematic process that helps them to develop strategies and create activities for instructional classes.

The nine events provide a framework for an effective learning process. Each step addresses a form of communication that supports the learning process. When each step is completed, learners are much more likely to be engaged and to retain the information or skills that they are being taught. Essentially, the steps give designers an outline or prototype to use prior to performing teaching or training activities.

He also made exceptional contributions in the field of instructional design. He propounded nine events of instruction, five E's of constructivism and nine elements of constructivist instructional design. He believed that skills should be learned at the lowest level and mastered, before proceeding. The instructor's reinforcement and repetition with each new skill, building positivity upon previously acquired skills.

Steps of instruction

Gain Attention: The first event or step of instruction is to gain attention, to get the reception of stimuli.

Informing the Learners the Objective: It is important to inform the learner, the purpose and expected outcome of the learning to provide the motivation to learners.

Stimulating Recall of Prior Learning: The learners are asked to recall the existing relevant knowledge. Presenting the Stimulus Relevant stimulus to the subject matter, should be presented.

Providing Learning Guidance: It requires the instructor to make the stimulus as meaningful as possible.

Eliciting Performance: The learners asked to demonstrate the newly learned behaviour.

Providing Feedback: Giving informative feedback to learner's performance is important.

Assessing Performance: It consists of assessments to verify that learning has occurred.

Enhancing Retention and Transfer: It refers to retaining the learned capability over a long period of time and transferring it to new situations, outside the learning environment.

Table : Nine Events of Instruction

Internal Process	Instructional Event	Action's Examples
Reception	Gaining attention	Use abrupt stimulus change
Expectancy	Informing learners of the objective	Tell learners, what they will be able to do after learning
Retrieval to working memory	Stimulating recall of prior knowledge	Ask for recall of previously learned knowledge of skills
Selective perception	Presenting the stimulus	Display the content with distinctive features
Semantic encoding	Providing learning guidance	Suggest a meaningful organisation
Responding	Eliciting performance	Ask learner to perform
Reinforcement	Providing feedback	Give informative feedback
Retrieval and reinforcement	Assessing performance	Require additional learner performance, with feedback
Retrieval and generalisation	Enhancing retention and transfer	Provides varied practices and paced reviews

Five E's of Constructivism

The **Five E's of Constructivism** was developed in **1987, by the biological sciences curriculum study**, promotes collaborative and active learning in which students work together to solve problems and investigate new concepts by asking questions, observing, analysing and drawing conclusions. It is an Instructional model, based on the Constructivist approach to Learning.

Each of the Five E's of Constructivism describes a phase of learning and allows students and teachers to experience common activities, to use and build on prior knowledge and experience and to assess their understanding of a concept. Whereas, constructivism is a learning strategy that draws on student's existing knowledge, beliefs and skills with a Constructive approach, students synthesise understanding from prior learning and new information.

The five E's of constructivism are-

Engage: This process helps to make connections between past and present learning experiences. Teachers can ask opening questions to students or task them to write down what they already know about the topic . It is also important to foster an interest of the students in the upcoming concept or skill.

Explore: In this phase, students actively explore the new Generalisation concept, through concrete learning experiences. They can be asked to go through the scientific method and communicate with peers to make observations.They identify and develop concepts,processes and skills.

Explain: This phase helps students to synthesise new knowledge and ask questions for clarifications. For the 'explain' phase to be effective, teachers should ask students to share what they have learned during the explore phase.

Elaborate: This phase helps students to apply what they have learned. Teachers may ask students to create presentations or additional investigations to reinforce new skills. The purpose is to develop a deeper understanding and to cement their knowledge, before evaluation.

Evaluate: In the last phase, teachers observe their students and check whether the students are totally familiar with the learned concepts or not. Means of evaluation are self-assessment, peer's assessment, writing assignments and exams.

Nine Elements of Constructivist Instructional Design

Gagne's approach to instructional design is considered a seminal model that has influenced many other design approaches.

The nine elements of constructivist instructional design are discussed below-

Reception: Voice modulations, gestures, short introductory video, handouts, etc. can be used for this purpose.

Expectancy: Learners are informed about what they are about to learn so that their interest will be developed.

Retrieval: Teachers must relate the new information with their prior knowledge.

Selective: Perception Information should be presented in a practical and easy to understand manner depending on the needs and level of students.

Semantic: Encoding helps students to learn and retain new information by use of examples, case studies, storytelling, etc.

Responding: Students can demonstrate what they have learned through question-answer rounds, etc.

Reinforcement: Reinforcement is given to the students in the form of feedback for helping them in retaining new information.

Retrieval: Student's performance should be assessed through some tests.

Generalisation: Students should apply what they have learned to new situations and conditions, then with practice they will be able to generalise it.

Applications of Computer in Education

Computers are the finest and most important gift of science and technology. It has done great miracles to mankind. Today, there is no aspect of our life that remains untouched by the use and application of computers. In the field of education, the use of computers is of utmost importance. In 1986, with the

introduction of New Education Policy, our country also took initiatives for making the use of computers in teaching-learning activities.

Computer Assisted Instruction (CAI)

It is defined as the use of computers and software applications to teach concepts or skills. IBM developed one of the first instructional computer systems in the 1960s, using mini-computers. It is an interactive instructional technique, whereby a computer is used to present the instructional material and monitor the learning that takes place. It uses a combination of text, graphics, sound and video in enhancing the learning process. Its programs use tutorials, drill and practice, simulation and problem-solving approaches to present topics and they test the student's understanding. The instructional work carried out with the help of computers is known as **CAI**. The computer is said to be ahead of the teaching machine on account of its capacity of doing more work, at the same time for an unlimited number of individual learners than the teaching machine.

Applications of CAI in Education

Hardware The computer as a machine represents the hardware. The teacher must have the knowledge to operate the computer.

Software The programmes containing instructions to the computer, in a language that it can understand are called software. The softwares used in CAI is of two types i.e. application software and system software.

Courseware It is the base of the instruction that is imparted to the learner by CAI. For example, a student of IX class wishes to learn about some topic. For this purpose, the computer machine as a hardware will need the services of software and the application and system programmes for its operation. These programmes will be prepared by the software programmer for its operation.

Advantages of CAI

- It is easy to change the instructions, practices, examples and tests.
- It is self-administered and just in time.
- Feedback can be either immediate or comprehensive or partial.
- It provides good lesson integrity.
- It is individualised and customised for users who need specific skills.
- Automatic record keeping.
- Program user interaction can after be increased, which offers more lesson control for more advanced learning that can be motivating for some users.

Disadvantages of CAI

- It promotes convergent thinking.
- Long development and a short shelf life.
- It is more costly to develop than hiring an instructor.
- It assumes reading ability and spatial acuity.

Computer Assisted Learning (CAL)

It may be defined as any learning that is mediated by a computer and which requires no direct interaction between the user and a human instructor, in order to run. It is developed by combining knowledge from all fields of education/learning, Human Computer Interaction (HCI) and cognition. It is an interactive instruction technique, whereby a computer is used to present the instructional material for the learning-teaching process. It is useful for teachers, when they can convey a vast amount of information in a very short period of time.

Types of CAL

Drill and Practice: It helps the learners to practice the skills that have previously been presented and that further practice is necessary for mastery. In this technique, students learn facts and memorise them by drill method. e.g. MCQs.

Tutorial: Under this method, the computer assumes the role of a tutor, introducing content providing practice and assessing learning. Tutorials are used to introduce new content to learners.

Problem-Solving: Problem-solving software allows learners to see the results of their reactions to various events. Learners manipulate variables and feedback is provided based on these manipulations. Though, sometimes it is difficult to provide feedback based individual choices of students without the computer.

Simulation: It provides a real life scenario with the material to be learned, being applied as it would in the real world. It provides a simplified representation of a real situation, phenomenon or process. It also provides an opportunity for students to apply knowledge in a realistic format without time, expense or risk associated with the real thing.

Games: They can create a contest for the learner. The learner can compete with the computer or other learner, while mastering the material. Usually, they are aimed at younger learners (those in the elementary grades). Games can substitute for worksheets and exercises.

Discovery: It gives an opportunity to learners to draw their own conclusions. It allows the learners to seek the answers on their own. It provides a large database of information, specific to a course.

Laboratory Mode: Computers are programmed to stimulate a variety of biological processes, to supplement the laboratory experiments. The learner explores various options and learns by inference.

Advantages of CAL

- CAL is individualised, that is each student is free to work at his own place, totally unaffected by the performance of any other students.
- Information is presented in a structured form. It proves useful in the study of a subject where there is hierarchy of facts and rules.
- CAL forces active participation on the part of the student, which contrasts with the more passive role in reading a book or attending a lecture.
- CAL utilises a reporting system that provides the student with a clear picture of his progress. Thus, students can identify the subject areas in which they have improved and in which they need improvement.

- By enabling students to manipulate concepts directly and explore the results of such manipulation, it reduces the time taken to comprehend difficult concepts.
- CAL offers a wide range of experiences that are otherwise not available to the student. It works as multi-media providing audio as well as visual inputs. It enables the student to understand concepts clearly with the use of stimulating techniques such as animation, blinking, graphical display, etc. .
- CAL provides a lot of drilling which can prove useful for low aptitude students.
- CAL can enhance reasoning and decision-making abilities.

Disadvantages of CAL

- A CAL package may be regarded simply as a novelty, rather than an integral part of the educational process.
- Though simulation permits execution of chemical and biological experiments, hand-on experience is missing. Moreover, CAL packages cannot develop manual skills, such as handling an apparatus, working with a machine, etc.
- There are real costs associated with the development of CAL systems. It is expensive in terms of staff time to devise and programme effective CAL.
- Content covered by a certain CAL package may become outdated. A very high cost is involved in the development of these packages. If the course is outdated, the resources involved in its development will be a waste.
- CAL packages may not fulfil expectations of teachers. Objectives and methods decided by the CAL author and of a teacher may differ.
- Motivating and training teachers to make use of computers in education is a challenging task. They may have fear of this new device. They may be unwilling to spend extra time for preparation, selection and use of CAL packages. It may also be perceived as a threat to their job.
- There are administrative problems associated with computer installation. The problems particularly related to the physical location of the computer resources, the cost of hardware maintenance and insurance and time-tabling
- The rapid development of hardware makes it difficult to select a system before it becomes obsolete. If a new system is installed by a maximum number of institutions, that may not get courseware required for the system and courseware developed so far may become useless.

Computer Based Training (CBT)

It is an interactive training experience in which the computer provides the learning stimulus and the trainee must respond, so that the computer analyse the responses and provides feedback to the trainee. CBT and CAL are both synonym terms. So, the application of CAL (drill, practice, tutorial and simulation) can be used in CBT as well.

Applications of CBT in Education

E-learning It is associated with e-learning, which involves computers and interactive networks, simultaneously. **Web Based Learning** It is associated with learning materials delivered in a web browser. It also includes materials packed on CD-ROM or other media, like, disk.

Problem-solving It helps to develop critical thinking skills. Learners can develop skills and follow directions through this technique. This approach often involves some type of problem, for which

students have to figure out a solution. Demo and Presentation This technique is often used to review information that has been learned. It is very useful, when a lecturer wants to present information in a lecture style format

Advantages of CBT

- Classwork can be scheduled around work and family.
- Reduces travel time and travel cost for off campus students.
- Students may have the option to select learning materials that meet their level of knowledge and interest.
- Students can study anywhere they have access to a computer and internet connection.
- Self-paced learning modules allow students to work at their own pace.

Disadvantages of CBT

- Learners with low motivation or bad study habits may fall behind.
- Without the routine structures of a traditional class, students may get lost or confused about course activities and deadlines.
- Students may feel isolated from the instructor and classmates.
- Instructors may not always be available when students are studying or need help.
- Slow internet connection or older computers may make accessing course materials frustrating. .

Computer Managed Learning (CML)

It extends the scope of CAI with self-contained instructional range and testing experience for students. It is an application of computer technology for accountability and documentation of student's progress, by electronic filling, sorting and reporting of his learning outcomes. of

According to Hofmeister, "The systematic control instruction by the computer, characterized by testing, diagnosis, learning prescriptions and through record keeping".

According to Hartmann, "CML as a record keeping system, a significant or information management system is an improvement over manually based operations".

Applications of CML in Education

- Computerised libraries with control access and remote access, as per needs.
- Learning assessment, through administration of pre-tests and post tests.
- .Design and preparation of learning prescriptions.
- Calculation analysis and storage of student's scores.

Advantages of CML

- CML system treats every student as an individual and helps teachers to follow their methods.
- It allows students to be extended or remediated as required.
- It makes computer software accessible and relevant.
- It gives back a huge amount of time from testing and marking that is better spent on creative student's learning.
- It provides previously unknown data on which to constantly refine and improve the teaching method.

For School Principals and Management

- It provides accurate measurement and analysis for informed decision-making.
- It facilitates quality control of teaching
- It provides an accountability process and control.

Disadvantages of CML

- The volume of information can present problems for teachers, providing too much material to use in reasonable ways.
- Not enough well trained educators assure proper use of systems.
- There is too much emphasis on data and not enough emphasis on instruction.

Open and Distance Learning Material (ODLM)

According to **Gunther Dohmen**, "Distance education is a systematically organised form of self-study, in which student's counselling, the presentation of learning material and the securing and supervising of student's success are carried out by a team of teachers, each of whom has responsibilities. It is made possible, at a distance, by means of media which can cover long distances. The opposite of distance education is direct education' or 'face to face education',. a type of education that takes place on the direct contact between lecturers and students".

According to **D Garrison and D Shale**, "Distance education implies that the majority of educational communication between teacher and students occurs non-contiguously. It must involve two way communication between teacher and student(s), for the purpose of facilitating and supporting the education process. It uses technology to mediate the necessary two way communication".

According to **Picciano**, "Distance education uses three current and popular forms of media: broadcast television, two way video conferencing and synchronous learning networks (multi-modal web based delivery of instructions that can be reviewed by the students at any time)".

In simple terms, the term distance education means the type of education that is organised by keeping in mind the distance factor, who imparts such education and who receives it, both are separated by a common factor, known as distance. It is a two way interaction and communication between the teacher and the learner, through information and communication technologies with a freedom of choice related to time, space, pace, medium, access and curriculum.

Process of ODLM

Distance education has a great challenge, before its planners and organisers. One should have thorough knowledge and expertise for going through the task of the planning and organisation of the activities, concerning a distance education programme.

The processes associated with planning and management of a distance education programme are :

Pre-Assumptions and Knowledge About the Learners: The planners before planning the programme must be clear about its purposes and objectives, like who may get benefit through the distance education programme?, what is their educational, social and cultural background?, what type of technologies, resources and skills are available at their end the accessing the programmes?, etc.

Distance Education requires :

- structured planning.
- well-designed courses.
- special instructional techniques.
- methods of communication, by electronic and other technologies.

Planning: It is the foundation stone of quality assurance in distance education. It should be systematic and well-planned. The planning should be done on the basis of social demand, educational demand, resources and teacher's profile.

Preparation of the Programme: It is the next step after doing the planning. In this stage, training objectives are prepared before implementing the programme, by assessing the training needs of the teacher. Then, a suitable curriculum is designed to fulfil the objectives.

Process of Course Design: It tells the dynamics of the various instructional inputs, involved in curriculum transaction. This includes mainly two components i.e. developing course materials and delivering mechanisms.

Evaluation of the Course: It is one of the most important components of the programme. Evaluation of the trainees, trainers, curriculum, materials, etc, should be done from time to time. Evaluation of overall programme effectiveness and achievement of training objectives, has to be done both formatively and summatively.

E-Learning

It stands for the type of learning carried out, facilitated or supported by some or the other electronic gadgets, media or resources. It is facilitated by the use of any electronic media, microphones and listening devices or audio and video tapes.

It is an electronically carried out learning facilitated and supported by the use of advanced learning technology of computers, networking and multimedia.

It is very much associated with the use of the internet and web technology via computers or laptops. Mobile learning may be well regarded as an extension of e-learning.

Bnooma Krishnan in his finding on the history of e-learning, mentioned four distinct stages in the evolution of the concept of e-learning, namely, multimedia era (1984-1993), web infancy (1994-1999), next generation web (2000-2005) and mobile learning. So, e-learning can be defined as a learning carried out, supported and facilitated by the advanced multi-media facilities, as well as internet and web technology delivered to the learners via computers, laptops, mobile and ICT appliances.

E-learning is defined in the **National Testing Information System** as "Any learning that is assisted by information and communication technology. This mainly includes computer based online learning, but also covers interactive CD-ROMs, Videos, handheld computers, mobile phones, tele-conference and video conferencing".

According to **Clark and Mayer**, "e-learning is instruction delivered on a computer by way of CD-ROM, internet or intranet".

According to Stockley, "e-learning is the delivery of a learning, training or education program by electronic means. e-learning involves the use of a computer or electronic device (e.g. mobile phone) to provide training, educational or learning material".

Advantages of E-learning

- It is a very efficient way of delivering courses online.
- Due to its convenience and flexibility, the resources are available from anywhere and at any time.
- Web based learning promotes active and independent learning
- Through discussion boards and chats, people are able to interact with everyone online and also clear doubts if any.
- People have access to the net, 24 x7, we can train ourselves anytime and from anywhere also.

Disadvantages of E-learning

- Most of the online assessments are limited to questions that are only objective in nature.
- There is also the problem of the extent of security of online learning programs.
- The authenticity of a particular student's work is also a problem as online just about anyone can do a project rather than the actual student itself.
- The assessments that are computer marked generally have a tendency of being only knowledge based and not necessarily practicality based. .

Approaches to E-learning

Any particular learning is termed as e-learning, when the mode of delivering instructions is electronic, like computers, multimedia, mobile and ICT appliances.

Different approaches to e-learning for different modes are discussed below-

Blended Learning: In this approach, a combination traditional and ICT enhanced e-learning practice is used. The programmes and activities are designed to present both the traditional classroom teaching practices and e-learning based instruction.

Mobile Learning: The easy availability and affordability of mobile devices has created the space for mobile enabled learning. It is the acquisition of knowledge and skills, through mobile technology, anytime and anywhere.

Online Learning: It refers to the use of online tools for learning. When lectures, assignments, tests are available on virtual platforms.

Offline Learning: Learning activities can be carried out offline. It includes the access of well-stored information and learning packages available in the form of recorded CD-ROM, DVD, etc.

Synchronous Learning: It resembles traditional classroom teaching methods, despite the participant being located, remotely. It requires a time-table to be organised, web-conferencing, video-conferencing,

educational television, instructional television. Examples of synchronous technology are Direct Broadcast Satellite (DBS), internet, radio, live streaming, telephone and web based VOIP. Online meeting software such as adobe connect, has helped to facilitate meeting in distance learning courses.

Asynchronous Learning: In asynchronous learning, participants access course materials flexibly on their own schedules. Students are not required to be together at the same time. Mail correspondence, which is the oldest form of distance education, is an asynchronous delivery technology, as are message board forums, e-mail, video and audio recordings, print materials, voice-mail and fax.

The last two methods can be combined. Many courses offered by the Open University use periodic sessions of residential or day teaching to supplement the remote teaching. The open university uses a blend of technologies and a blend of learning modalities (face to face, distance and hybrid) all under the rubric of 'distance learning'.

Distance learning can also use Interactive Radio Instruction (IRI), Interactive Audio Instruction (IAI), online virtual worlds, digital games, webinars and webcasts.

Emerging Trends in E-Learning

E-Learning

E-learning or electronic learning is the type of learning carried out, facilitated or supported by some or the other electronic gadgets, media or resources. It facilitates the use of electronic media, like microphones and listening devices, like audio and video tapes.

In this sense, e-learning may call for the services of the advanced electronic information and communication media like CD-ROMs, DVDs, tele-conferencing, video conferencing, computer based conferencing, e-mail, live chat, surfing on the internet and web browsing, online reference libraries, video game-style simulation, customised e-learning courses and web blogs.

According to Rosenberg (2001), "e-learning refers to the use of the internet technologies to deliver a broad array of solutions to enhance knowledge and performance".

According to Santheesh Kumar and Saggy John, "Though computers are used for instruction and learning, the non-web technology does not come under e-learning. The entire computer based instruction, like computer assisted instruction and computer managed instruction, integrated learning systems, multimedia, interactive video, virtual reality, Artificial Intelligence, etc, are not delivered through the internet but are still used for learning and instruction that cannot be included in e-learning. However, when these techniques are delivered via the internet for instruction and learning, it becomes e-learning".

Nature and Characteristics of E-Learning

- It is used to refer to computer enhanced learning.
- It is a type of online learning carried out through the internet or web-enabled technology.
- It conveys broader meaning compared to the terms computer based teaching and computer aid instruction.
- It should not be taken as synonymous to audio-visual learning. Now a days, multimedia technology and distance education programmes rests heavily on the use of the internet and web services provided through the computers, yet these identical but complementary
- It is restricted to the type of e-learning carried out, facilitated or supported through web-enhanced instructions and the internet based communication, like e-mail, audio and video conferencing, mail list, live chats and telephone

Emerging Trends in E-Learning

The technological trends of e-learning are enormous and growing at a very rapid pace. Some of the emerging trends of e-learning are mobile learning, micro-learning, adaptive e-learning, Artificial Intelligence, etc. All these trends help people to get access to a world class learning experience.

The technological trends of e-learning are enormous and growing at a very rapid pace. In this competitive world, daily new trends are being emerged to provide good learning techniques to the learner. It helps people to get access to a world class learning experience, when traditional learning may not be possible due to financial, personal or any other constraint.

Some of the emerging trends of e-learning are

Mobile Learning

It is the ability of an individual to obtain or provide educational content on personal pocket devices, such as PDAs, smartphones and mobile phones. Mobile phones are considered to the best platform for e-learning because

- It has the potential to reach masses
- Carried all the time
- Easy to use
- Just in time learning .

Micro-Learning

It is a way of teaching and delivering content to learners in small, very specific bursts.

The main benefits of this kind of learning are-

- Rich media
- Accessible
- Less time consuming
- Just in time
- Learner-centric Less time consuming
- Learner-centric

Gamification

This type of e-learning is through games and it really depends on the program and the audience desires.

Some of the benefits of gamification in e-learning are -

- Better learning experience
- Helps to remember for long time
- Instant feedback
- Better learning experience

Adaptive E-Learning

Adaptive e-learning uses computers as interactive teaching devices. These methods arrange the allocation of human and mediated resources according to the unique learning needs of each learner.

Some major benefits of this technological trend in case of e-learning are-

- Very rich study resources
- Saves a lot of time of learners

Augmented Reality

This technology superimposes a computer generated image on a user's view of the real world. It is really a great boon technology for the students or learners in general. This technology needs devices, internet and software of augmented reality.

Some benefits of augmented reality in case of e-learning can be as follows-

- Easy, instant and deep learning of things
- Huge collection of information

Internet of Things (IOT)

It refers to the ever growing network of physical things or objects around us which hold IP addresses for internet connectivity and the communication that occurs between these connected objects and other internet enabled devices and systems.

Some major benefits of IOT in case of e-learning are-

- Learner is part of the learning system as an entity Some of the advantages are
- Continuous tracking of learner by the system
- Continuous updates to learners

Cloud Based E-Learning

This type of e-learning creates ripples in the field of education and business. These learning systems are hosted on the internet and can be easily accessed by logging into a service provider's site. Rather than installing all the software and course on the user's computer, the instructional designer will simply use their internet browsers to upload course content, create new courses and communicate with learners and users directly.

- Faster development
- Cost predictability
- Easier to maintain
- Learner oriented service request
- More storage space

Video E-Learning

This kind of e-learning helps the learner to grasp the content by watching the videos. This kind of e-learning gives a very quick idea and helps to understand things with multimedia effects. This serves as a very effective medium of e-learning.

Some benefits of video e-learning can be as follows-

- Video explanation
- More information in less time.
- Best learning experience.

Becon E-Learning

Becon e-learning is a wireless device that transmits signals or other nearby devices via low-energy bluetooth connections. This is used in Indoor Positioning System (IPS).

Some great benefits of this technological trend are-

- Better accessibility.
- More powerful communication.
- Increased intellectual discovery.
- Insightful data.
- Improved in-class experiences.

Artificial Intelligence

It is something like intelligent software which is designed to take some intelligent actions reading the entire environment around it. The involvement of artificial intelligence in e-learning helps the learner to make very wise decisions and quality resources, which in turn helps the learner to excel and make his achievements at a faster pace.

Some major benefits of AI in case of e-learning are

- Provides expert tutors for learners
- Automated teaching
- Rich information

Social Learning

Social learning is learning from others. This kind of learning can occur through direct as well as indirect contact. Direct contact refers to face to face interactions whereas indirect contact refers to interactions on social media. It creates a learning setting where learners can network, share, collaborate and exchange ideas on problem-solving. It is the learning that takes place through social interaction between peers and it may or may not lead to a change in attitude or behaviour.

- If learning is to be considered 'social,' then it must demonstrate a change in understanding that has taken place in the individuals involved. This may be at a surface level (recalling new information) or deeper levels (change in attitude, beliefs).
- go beyond the individual to become situated within wider social units or communities of practice within society.

- occur through social interactions and processes within a social network, either through direct interaction (conversation) or through other media (social media).

Thus, social learning may be defined as a change in understanding that goes beyond the individual to become situated within wider social units or communities of practice through social interactions between actors within a social network. It includes tools, like Web 2.0, social networking sites, blogs, chats, video-conferencing and discussion forums for learning.

World Wide Web/Web 2.0

Web 2.0 is simply an improved version of the first World Wide Web, characterized specifically by the change from static to dynamic user generated content and also the growth of social media. The concept behind web 2.0 refers to rich web architecture and social web. It refers to applications, web-oriented to changes in the ways web pages are designed and used by the users, without any change in any technical specifications. Web 2.0 examples include hosted services (Google Maps), web applications (Google Docs), video sharing sites (You Tube), blogs (WordPress), social networking (Facebook), microblogging (Twitter) and content hosting services and many more. It enables users to create, share, collaborate and communicate their work with others, without any need of any web design skills. These capabilities were not present in web 1.0. By using web 2.0 tools in the learning process, students have the opportunity to develop their learning skills as they learn new research methods, become independent researchers, develop skills in creative thinking, solve problems, become team workers, manage their own development and education.

Web 2.0 tools support a Constructivist approach to education where students discover and construct knowledge as opposed to acquiring it. This enables a two-way knowledge exchange where students cannot only obtain information from the internet, but also contribute and upload knowledge to it.

Teachers and educators need to embrace this new approach in their teaching strategies, and should provide an infrastructure to support the construction rather than the transfer of knowledge. Empowering students to take charge of their learning shifts and the role of the teacher from instructor to learning partner. Learners are given greater choice by providing different ways of navigating through curriculum content. Giving student

ownership of their learning promotes a deeper understanding of concepts. However, there is a need to create a balance between the freedom and creativity of developing learning experience and ensuring that some level of structure is adhered, so that effective learning can take place.

Advantages

- Form a partnership with schools in different countries,
- Vast amount of information is available on the website.
- A distant education institute helps its students around the world (apply or register to course).
- It facilitates rapid interactive communication.
- It involves low cost for initial connection.
- It has become the global media and is accessible from everywhere in the world.
- Learners can actively be involved in knowledge building

- It provides real time discussion.

Disadvantages

- Danger of excess and worthless content.
- Net often becomes overloaded because of the large number of users.
- No quality control over available data.
- There is no regulation.

Social Networking sites

A social networking site is a platform to build social networks or social relations among people, who share interests, activities, backgrounds and real-life connections. Most social network sites are web based and provide a variety of ways for users to interact, such as e-mail and instant messaging services, etc. Some examples of social networking sites are Pinterest, Yahoo, Skype, Instagram, LinkedIn, YouTube, Google, Twitter, Facebook, Gmail, etc. same.

Advantages

For Students

- Improvement of communication skills.
- Improvement of technological skills. .
- Increase in the exposure of diverse views.
- Develops a positive image.
- Increase the engagement of learning.
- Encourage students to express their own thoughts.
- Build an online learning community.

For Teachers

- Increase the access to resources.
- Collaborate with other staff.
- Exchange information and plan lessons.
- Reach to parents who are not able to come to school. .
- Get feedback from schools and events.
- Communicate effectively with parents.

Disadvantages

- It can lead to online bullying.
- Distraction from academic study.
- It might result in wastage of time.

Blogs

It is a term used for web log. It is like an online diary of a journal, except they are not private, instead they are created for an audience. And just like a diary or journal, a blog makes an easy and comfortable way for students to write. Blogs are written on all kinds of topics. Readers can usually leave comments, which lead to discussions about the blog's content. For example, a blog about flipping your classroom

can lead to a discussion between novice and experienced teachers about common questions, advice, tips, and clarifications. Few examples of blogs are Kidblog, Edublog, Wordpress, etc.

Advantages

- Teachers can publish assignments, resources and keep students and parents up to date on class events, due dates and content being covered.
- Teachers can also use blogs to help students to master content and to improve their writing skills.
- Students can use blogs to publish their writing and educate others on a particular topic.
- Enhance student's communication skills and increase student's investment in learning.

Disadvantages

- It is time consuming.
- It involves a lot of effort to maintain the quality of the content on the site.
- Hard to grade and assess for educators.
- Learners can be distracted easily.
- Lack of speaking and listening skills training.

Chats

Web based chat platforms are gaining popularity as teachers look for ways to incorporate technology in the curriculum. Achieving the education goal with texting and other digital communication, well implemented electronic chats can support learner's critical thinking. It helps students to establish a direct connection with the instructor as well as classmates.

Advantages

- It promotes real time collaborations.
- It leads to deeper processing of class material.

Disadvantages

- Teachers are required to perform an intentional planning to establish online etiquettes and a process for orderly turn taking, so that every student should get a chance to participate.
- It is difficult for teachers to ensure student's safety.

Video-Conferencing

Video-conferencing is a technology that allows users in different locations to hold face to face meetings without moving to a single location together. It can also be used as a medium for conducting training, with the instructor, teaching a remote class from mostly anywhere.

It possesses wide educational applications for the best possible outcomes of the tele-conferencing system. It made it easy for the students, sitting in a classroom at one location can discuss a project with students at different locations. These students can see real time video images of a classroom in a distant location. The learners can type the messages on the screen in a 'chat window'.

Advantages

- Students can easily exchange information, can have conversations and can get immediate feedback.

- Learners can write and can share ideas of their own composition and can have evaluation on them.
- Students can work on a joint project by adopting the mode of tele-conferencing.
- Students can share ideas and information for better understanding and application of learned material.

Disadvantages

- There can be a short time lag between speaking and receiving a response that can disrupt the natural flow of conversation.
- It requires high internet connectivity.
- A set of high quality video-conferencing systems is costly.
- It lacks personal interaction.

Discussion Forum

A discussion forum is a virtual place on the internet where conversations can take place and information can be shared more easily among a geographically dispersed group of people. Discussion forums can be public or private, depending on the forum's objective and desired level of access into the forum. It's a good idea to use discussion forums instead of direct personal email whenever privacy or Security concerns Don prevent it, even when the communication only involves two project members.

Learners join the discussion forum and their questions are posted and stored for everyone to read and respond. Students can have discussions with each other on course related topics.

Advantages

- Engage students in active learning.
- Promotes growth for collaborative learning communities.
- Learner's queries are posted and responded to.
- Provides flexibility to students, as they can use it anywhere and anytime.

Disadvantages

- Discussions can go beyond the topic.
- It requires consistent input of teachers.
- It can be hindered by technical problems (server down or network down).
- It needs to be monitored for an inappropriate posting.

Whereas the development of Massive Open Online Courses (MOOC) is rooted in the ideals of openness in education. The knowledge should be shared freely and the desire to learn should be met without demographic, economic and geographical constraints.

Open Education Resources (OER)

Open Educational Resources are freely accessible, openly licensed text, media and other digital assets that are useful for teaching, learning and assessing as well as for research purposes. The development and promotion of open educational resources is often motivated by a desire to provide an alternate or enhanced educational paradigm. According to **William and Flora Hewlett**, "Teaching Learning and

research resources that reside in the public domain or have been released under an intellectual property license, that permits their free use and re-purposing by others. It includes full courses, course materials, modules, textbooks, streaming videos, tests, software and any other tools, materials or techniques, used to support access to knowledge”.

According to **UNESCO**, “Teaching-learning and research materials in any medium, digital or that resides in the public domain or have been released under an open license that permits no-cost use, adoption and access,

redistribution by others with no or limited restrictions. Open licensing is built within the existing framework of intellectual property rights as defined by relevant international conventions and respects the authorship of the work”.

Thus, we can conclude that OERs are learning materials that can be modified and enhanced because their creators have given others permission to do so. The individual or organisations that creates OERs which include materials, like presentation, slides, podcast, syllabi images, lesson plans, lecture videos, maps, worksheets and even entire book's waive, some copyright associated with their works via legal tools, like creative commons licenses, so others can freely access, reuse, translate and modify them.

Characteristics of OER

- Clear copyright issues,
- Formatting of web and accessibility for reuse.
- Addition of descriptive meta-data.
- Published on the web.
- Available to all faculties, students and institutions.
- Shared openly and freely. .

Educational resources are no longer static but adaptable and widely available, allowing educational institutions, teachers and learners to actively participate in a global exchange of knowledge via Open Education Resources (OER). Creative commons provides the legal and technical infrastructure essential to the long term success of OER.

Creative Commons

It is a non-profit organisation that enables the sharing and use of creativity and knowledge through free legal tools. Creative common licenses allow content's creators to openly declare the level of sharing that is allowed with their work.

Most OER's resources use Creative Commons (CC) licences because they are well known blanket licenses that are free and easy to use. A creator only needs to select a type of CC licence that they want from the CC website.





It creates a "Some Rights Reserved Model". The copyright owner retains copyright ownership in their work, while inviting certain uses of their work by the public. Its licences create choice and options for the copyright's Owner.

Thus, CC licensing is a legally valid and accepted form of licensing and is meant to work in conjunction with and to support the 'All Rights Reserved Model'.

Applications of creative commons

CC licences types CC consist of four rights.

The four creative commons licenses are given below-

Icons	Rights	Short Description
	Attribution (BY)	This license lets others to distribute, remix, tweak and build upon your work, even commercially, as long as they credit you for the original creation.
	Non-Commercial (NC)	Licenses may copy, distribute, display and perform the work and can make derivative works based on it, only for non-commercial purposes.
	No Derivative Works (NDW)	Licenses may copy, distribute, display and perform only verbatim copies of the work, not derivative works based on it.
	Share Alike (SA)	Licenses may distribute derivative works only under a license, identical to the license that governs the original work.

CC Facilitates Innovation in Education



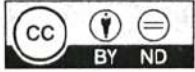



CC licenses help educators to broaden the impact of their educational resources and the needs of their students and find relevant OER.

CC Enables Translation of Educational Resources into Different Languages: When educational resources released under a CC licence permitting adaptations, anyone interested in the subject matter may translate those resources.

CC Enables Educational Resources to Evolve and be Improved: CC licensed OER are living documents that can be built upon and improved not only by authors but by students as well.

CC Enables Easier Discovery of Educational Resources on the Web: CC has broadened the impact of OER by embedding each of its licenses with software code that makes the license terms machine readable i.e. discoverable by a search engine.

Structure of CC Licensing

Icons	Short Description
	This license lets others to distribute, remix, tweak, and build upon your work, even commercially, as long as they credit you for the original creation. This is the most accommodating of licenses offered. Recommended for maximum dissemination and use of licensed materials.
	This license lets others to remix, tweak and build upon your work even for commercial purposes, as long as they credit you and license their new creations under the identical terms. This license is often compared to copyleft free and open source software licenses .
	This license allows for redistribution, commercial and non-commercial, as long as it is passed along unchanged and in whole, with credit to you.
	This license lets others to remix, tweak and build upon your work non-commercially and although their new works must also acknowledge you and be non-commercial, they don't have to license their derivative works on the same terms.
	This license lets others to remix, tweak and build upon your work non-commercially, as long as they credit you and license you new creations, under the identical terms.
	This license is the most restrictive of the six main licenses, only allowing others to download your works and to share them with others as long as they credit you, but they can't change them in any way or use them commercially.

It is used to secure various contents over the internet. It is used to safeguard the contents on the web pages, it can be videos, documents, pictures and audios, etc.

Massive Open Online Courses (MOOC)

A MOOC is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials, such as filmed lectures, readings and problem sets, many MOOCs provide interactive user forums to support community interactions among students and professors. They are recent and widely researched developments in distance education, which were first introduced in 2008 and emerged as a popular mode of learning in 2012.

Earlier, they often emphasised open access features, such as open licensing content, structure and learning goals, to promote the reuse and remixing of resources, but later they use closed licenses for their course materials, while maintaining free access to students.

They can be seen as a term related to the scalability of an open and online education. They are courses designed for a large number of participants that can be accessed by anyone and at anywhere as long as they have an internet connection, open to everyone without entry qualifications and offer a free complete course experience.

Applications of MOOC

- It gives an open access to ask queries to professors.
- It contains open courses for all interested, regardless of location, resulting in a more diverse student's base.
- Students can collaborate with their peers from different parts of the world.
- It provides an opportunity for online interaction among students. Students can share work, critique and receive other's feedback.
- It helps professors to reevaluate their pedagogical methods, while improving knowledge sharing.

E-Inclusion

E-inclusion refers to the degree to which information and communication technologies contribute to equalising and promoting participation in society at all levels. According to Hewlett Packard, "The purpose of the e-inclusion initiative is to fill the gap between the technologically empowered communities and the technologically excluded communities on our planet by making it profitable to do so". It is a social movement, whose goal is to end the digital divide, a term used to describe the fact that the world can be divided into people, who have and who don't have access to and the capability to use modern Information Technology (IT). It has the power to close the gap between developed and less developed countries and to promote democracy and mutual understanding. It empowers disadvantaged individuals, such as poor, disabled and the unemployed.

Applications of Assistive Technology in E-learning

It is a technology used by individuals with disabilities, in order to perform functions that might be difficult or impossible for them. It includes mobility devices, such as walkers and wheelchairs, as well as hardware and software techniques that assist people with disabilities in accessing computers or other information technologies.

For example, people with limited hand function may use a keyboard with large keys or a special mouse to operate a computer, people who are blind may use a software that reads text on the screen, people with low vision may use software that enlarges screen content, people who are deaf may use a TTY (Text Telephone) or people with speech impairments may use a device that speaks loudly as they enter text via keyboard.

It is a broad concept, covering everything that might be used to compensate for lack of certain abilities ranging from low-tech devices, like crutches or a special grip for a pen to more advanced items, like hearing aids and glasses, to high-tech devices, such as brailers and computers with specialised softwares for helping dyslexics to read.

Despite the positive impacts and advancement of AT, use of AT in inclusive education is still limited to developed countries.

Some other assistive devices for different categories of disability are discussed below-

Assistive Devices for Visually Impaired Children Computer screen magnification, descriptive video services, screen readers, Braille, scanning software, independent text reading, audio devices and Braille notetakers.

Assistive Devices for Hearing Impaired Children Personal Frequency Modulation (FM), Infrared Systems, Infrared Loop Systems, Text Telephones (TTY), Computerised Speech Recognition, Closed Captioned T.V.

Assistive Devices for Speech Impaired Children Augmentative and Alternative Communication (AAC), first words, picture exchange communication system, hand held (portable) or computer electronic speech devices.

Assistive Devices for Orthopedically Impaired Children Computer accessibility, adapted recreation equipment, daily living equipment, access to classroom or workspace science laboratory.

Assistive Devices for Children Having Learning Disabilities Abbreviation expanders, paper based computer pen, electronic math worksheets, free form database software.

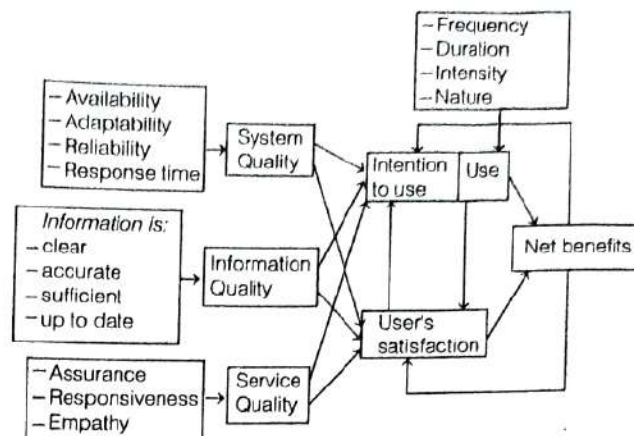
Quality of E-learning

The quality of education can be defined from three perspectives that are technological, economic and pedagogical. The quality standards were associated with particular outcomes in the past. This meant that quality was evaluated on the basis of course quality and pre-defined learning outcomes. This approach has changed in the recent year due to the introduction has changed in the recent year due to the introduction of e-learning.

It must be said that e-learning is not just another way of implementation of traditional teaching, but it is a new approach to education. Quality of e-learning can be assessed by two ways i.e. through benchmarking or by the specification of standards. Benchmarking means the comparison of performance and results achieved by the evaluated entity against the results and performance of the entity operating under comparable conditions. When standards are defined, the performance is set by comparing them with standards. It is necessary to implement a system of quality that ensures the required minimum level of e-learning quality across the curriculum.

D & MIS Success Model

In 2003, DeLone and McLean introduced an update to their earlier 1992 IS model. According to them, Quality has three major dimensions that is Information quality, system quality and service quality. Their model also includes intention to use and net benefit as given in below diagram.



It has been widely used to gauge success. It has been modified to meet the requirements of information systems. IS aspects to e-learning systems, the programmed level enables learning, communication, programme and course delivery and other user based activities. This model has been widely used by IS researchers for understanding and measuring the dimensions of IS success. The dimensions of IS includes

System Quality: The desirable characteristics of an information system. For example, ease of use, system's flexibility, system's reliability and ease of learning as well as system features of cuitiveness, sophistication, flexibility and response time.

Information Quality: The desirable characteristics of the system outputs, that is management reports and web pages, for example, relevance, understandability, accuracy, conciseness, completeness, currency, timeliness and usability.

Service Quality: The quality of the support that system's users receive from the IS department and IT support panel. For example, responsiveness, accuracy, reliability, technical competence and empathy of the personal staff.

System Use: The degree and manner in which staff and customers utilise the capabilities of an information system. For example, amount of use, frequency of use, nature of use, appropriateness of use, extent of use and purpose of use.

User's Satisfaction: User's level of satisfaction with reports, websites, and support services, for example, the most widely multi-attribute instrument for measuring user's information satisfaction.

Net Benefits: The extent to which IS is contributing to the success of individuals, groups, organisations, industries and nations. For example, improved decision-making, improved productivity, increased sales, cost reduction, improved profits, market efficiency, consumer welfare, creation of new jobs and economic development,

Thus, **DeLone and MCLean's IS Success Model** is a successful model for developing comprehensive e-commerce success measures. The complex, multidimensional and interdependent nature of the model requires careful attention to the definition and measurement of each dimension of this dependent variable.

Ethics in E-learning

According to Collin's Essential English Dictionary, "Ethics is defined as a code of behaviour, usually that of a particular group, profession or an individual". According to Toprak Etal, "In the field of education, ethics is significantly rooted in the concern with equal access to education by anyone, regardless of gender, nationality, ideological differences and physical or mental disabilities". Need for ethics is born because of the 'psychological distance' arising from the absence of face to face interaction within an online community of e-learners. It implies that in any classroom situation, no less than a virtual classroom, both learners and teachers are expected to know and to follow the acceptable ethical norms. Thereby, creating an educational atmosphere that is conducive to optimal teaching and learning, everyone knows

his/her role and has the obligation to exercise it. Also, individual factors, such as differences in age, cultural, academic, political and religious backgrounds, coupled with different attitudes towards e-learning, necessitate that some ground rules should be laid down to ensure that all are on the same page of thought. Therefore, acceptable behaviour in the traditional classroom is just as valid and needed in the virtual classroom.

E-learner and E-teacher

In an online community of e-learners and e-teachers, ethics demand that the established communication protocol should be set between all parties, while instructional ethics places this on us and on the e-teacher to comply accordingly.

The ACM Code of Ethics and Professional Conduct (1992), highlights the few key ethical concerns, applicable to all online users, namely, contributing to society and human well-being, avoiding harm to others, being honest and trustworthy, being fair and takes actions not to discriminate, honouring property's rights including copyrights and patents, giving proper credit for intellectual property, respecting the privacy of others and honouring confidentiality. The list reiterates the need for mutual respect, justice and goodwill in one's conduct, when engaging others online.

Following are some of the etiquettes, most commonly required during engagement in any online teaching-learning environment:

- Avoid off the topic messages that may disturb or annoy other participants.
- Be careful of the tone of language, while writing a message.
- Do not send insulting messages (e.g. comments about spelling mistakes) or launch personal attacks on other participants in an online discussion.
- Do not post advertisements and commercial messages, political and religious messages and hoaxes.
- Do not send messages that may constitute invasions of privacy. For e.g. posting another person's telephone number without permission and messages that are misleading or in any way defamatory, offensive obscene and abusive any message that promotes discrimination, violence and hatred).

Ethical Issues for the E-teacher

- The most important moral challenge for the e-teacher is maintaining the quality of the educational process.
- e-teacher must be attentive to new ways of transmitting information and assuring genuine communication.
- Providing a reliable network infrastructure with effective learning software becomes absolutely critical for the e-teacher.
- e-teacher must be attentive to educate the e-learners regarding the ethical use of internet resources.

Ethical Issues for the E-learner

- e-learners are becoming psychologically distant in their interactions with others.
- There is inappropriate assistance on examinations being provided to e-learners.

- There is a lack of knowledge of curricular regulations and academic code of behaviour for the e-learner.

Research

Virtually nothing is available that applies the established principles of ethical inquiry to this new important area of moral exposure for educational institutions. Further, there is little research which is focused on the quality of learning outcomes in online education and distance education. Both of these areas represent imposing challenges for modern educational institutions and topics of significant opportunity for ethics and education scholars.

Conclusion

In the phase of technological advancement and cyber bullying, it is a challenging task to ensure integrity. Thus, it justifies the need for a code of ethics to be set in place. The ethical conduct of an online community is guided by both institutional policies and communal agreement. When all members cooperate and agree to ethically conduct themselves in their respectful roles as e-learners and e-teachers then effective learning occurs and the objective of education is attained.

Uses of ICT in Evaluation, Administration and Research

Information and Communication Technology (ICT)

ICT plays an important role in enhancing the quality of education. Its applications in education can be considered as an effective enabler to Create access stores, transmit and manipulate different information in audio and visual form, due to the capability of ICT in providing a proactive environment.

ICT means a variety of technological applications in the process and communication of information. It is a combination of three words i.e. 'information', 'communication' and 'technology'. 'Information' means 'knowledge', 'communication' means 'to communicate' and 'technology' means 'the use of computers'. It can be defined as "the integration of computing, networking and information processing technologies and their applications". It refers to technologies that provide access to information through tele-communications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. It means a combination of computer applications and communication technology for gathering, processing, storing and disseminating information. It is a common term, referring to the technologies used for collecting, storing, editing and communicating information in various formats. It includes the computer hardware, software, application of tele-communication technologies, projection devices, Local Area Network (LAN), Wide Area Network (WAN), digital cameras, Compact Disks (CDs), Digital Video Disks (DVDs), cell phones, satellites and fiber optic cables.

According to **Beckinsale and Ram**, "Any technology used to support information gathering, processing, distribution and use".

According to **OECD**, "ICT refers to the combination of manufacturing and services industries that capture, transmit and display data and information electronically".

According to **SER**, "ICT is a generic term referring to technologies, which are being used for collecting, storing, editing and passing information in various forms".

According to **C Bwrton**, "ICT is a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information".

Thus, the term ICT implies the technology, which consists of electronic devices and interactive materials that enables the user to experience a wide range of teaching-learning experiences.

Uses of ICT

- The use of ICT offers a platform for students to question, investigate and construct new information in the process of teaching and learning.
- The use of ICT creates collaboration and interaction among students and teachers regardless of where they are.
- It helps in improving learner's teaming and commutative skills as well as their global awareness.
- ICTs improve learning by an integrative approach to teaching and learning.
- It allows learners to explore and discover and it recognises many different learning pathways of knowledge.
- To exchange and share ideas among teachers for professional growth.
- To carry out internet based research, to enhance the educational process.

Use of ICT in Evaluation

Evaluation is a systematic process of collecting, analysing and interpreting information to determine the extent to which pupils are achieving instructional objectives. It is a continuous process which emphasises major objectives of an educational programme.

There are three types of evaluations and they are-

Diagnostic Evaluation This type of evaluation is conducted at the beginning of a teaching session, to determine the learning level of children and to group them. As per the learning levels, teachers may organise the learning experience / activities.

Formative Evaluation This type of evaluation is conducted during the course of teaching, to identify the learning performance of children. It helps children to mark out performance in learning and teachers may modify learning activities accordingly.

Summative Evaluation This type of evaluation is conducted at the end of an instruction activity/unit course. This will help to grade learners and to judge the effectiveness of teaching. It helps in value judgement,

As mentioned above, diagnostic evaluation is performed before the teaching session. At this stage, teachers may utilize ICT in place of verbal questioning. For example, Multiple Choice Questions can be prepared in computers (using application software) and children may be directed to attempt those

questions. In case of formative evaluation, learners may be directed to attempt the questions provided in the learning management systems, like Google classroom, Moodle and Edmodo.

During summative evaluation, the possibilities of online examination could be tried out. Other techniques for evaluation can be viva or oral test, practical tests, written tests, short answer type questions, true-false type and matching type questions, rating scales, checklists, questionnaire, interview and observation.

In the teaching and learning process, ICT is used for both teaching and evaluating student's performance.

Integrating ICT in evaluation of children's performance is important for the following reasons-

- ICT enabled assessments, provide scope to children for engaging in individualised testing situations.
- ICT integrated assessment provides immediate feedback to the children. It also increases the confidence of students as they receive instant feedback.
- The frequency of assessment can be increased, that would benefit children and will continuously engage them in their studies.
- It generates interest and increases motivation among learners, as they carry out various types of technological assisted tests.
- Technological assisted testing/ assessment techniques are cost effective and can be easily prepared.
- It helps to develop high order thinking and digital literacy skills.
- It caters to the tastes of multiple audiences who differ in intelligence, creativity, etc.

So, ICT in the teaching-learning process enables us to evaluate the instructional activities and learning achievements of children. The paper and pencil tests, unit and term end examinations, oral questioning techniques, etc are some of the traditional evaluation methods. A simple example would be of recording the marks of children in excel sheets. Earlier the marks of the students were recorded in paper sheets, but today application softwares such as Microsoft Excel are used to record it,

Use of ICT in Administration

The use of Information Communication and Technology (ICT) can improve education quality, expand learning opportunities and make education accessible. ICT is very essential for the generation of quality information and management of that information which is required for effective decision- making.

- ICT assists the school administrators to meet the task of school management in the areas of curriculum and instruction, school community relationship and school business operations.
- Introduction of ICT in schools or colleges enhances the daily routine, programmes, evaluation as well as staff development.
- ICT can significantly influence effective planning in administration.
- The introduction of ICT tools in administration will solve the problem of poor communication in educational institutions.
- With ICT enabled administration there will be better working methodologies and re-engineered work processes.
- ICT promotes centralised storage of files and data. This enhances maintenance, reduces unnecessary efforts, minimises storage space and reduces security risks.

Internal Administration

Internal functioning of administration will become effective with the application of following devices-

Wireless Devices: Wireless communication devices, like cellular phones. For example, integration with wireless technology should be taken up for effective functioning of government departments.

Unified Messaging: It provides users with the ability to access, receive and send different types of messages, like fax, emails and voice-mails through a common single interface.

e-mail: It facilitates inter-employee communication and inter-department communication, as communication can be sent, received and replied across electronically.

File Tracking Module: All files move from one section to the other and from one desk to the other in a well laid down pattern. It helps to maintain a central record of the status of the files.

Planning and Decision-Making

ICT enables planning and decision-making with the help of following applications:

Geographical Information System (GIS): It can capture, store, check, integrate, analyse and display data using digitised maps.

Management Information System (MIS): All information is smoothly exchanged among different levels and the database is consolidated for planning and monitoring different schemes.

Computerisation: Computerisation of all sections of the governmental departments has made the system efficient in policy-making and policy implementation.

Connectivity: Connectivity among various governmental departments is provided horizontally and vertically through LAN and WAN.

Video-Conferencing: It can be used for urgent matters for consultation with senior officers, without calling them from their office.

Service Delivery

Through ICT's enabled service delivery, administration is able to provide:

- qualitative and comprehensive information departmental websites, especially in local languages.
- integrated and seamless services to the citizens. a large set of conveniently located access points.
- accountability and efficiency, as they are able to dispose of cases online.

Use of ICT in Research

Applications of ICT are mainly used by researchers for its ability to ease the knowledge gathering process and to enhance resource development. It helps the researcher to identify appropriate information sources, critically analyse information, research effectively, manage information, use the information to extend and communicate knowledge, across subject fields, search up to ten databases and electronic resources, simultaneously, receive results in a common format, link to individual databases for more

specialised searching and select favourite resources and e-journals, save searches and records, and set up email alerts.

With widespread computer networking among educational and research institutions, researchers can use e-mail to access data. They can exchange their research papers, proposals, formats and so on quickly and conveniently. Thus, e-mail keeps them in touch with professionals and experts and can enable them to access a variety of databases in almost every academic field in any part / institution of the country.

So, the various applications of ICT in the field of research are-

E-mail Researchers can use e-mail to access data and to exchange with their resources through e-mail.

Video Disc It is a product of the optical disc family. It has the capacity to store information, data, visuals and voice.

Speech Recognition This feature allows a computer to recognise human speech or words. It translates the spoken words into information and makes it easier for people to do their job and learn.

E-Portfolio

Generally, the school keeps records of marks scored by the children in different subjects, also data about their family background, physical records, involvement and achievement in extracurricular activities, etc. are also recorded. All this is a part of evaluation assessment. The grades/marks represent children's performance. The multiple data relating to a student is recorded, systematically. Portfolio's document, learning performance, activities performed, details of participation in co-curricular activities and other relevant data concerning the involvement of students throughout the session. Such a record is highly useful in evaluating the student's performance during his/her schooling. But, since the advent of digitalisation, we use the term e-portfolio.

An e-portfolio is a digital collection of overtime work that showcases skills, abilities, values, experiences and competencies through a broad range of evidence based learning. It is the record of digital works performed by the student. The digital works include text material prepared in Microsoft Word software, PDF or other application softwares, video and audio clips, digital images, digital reports, blog entries, comments posted in discussion for PowerPoint presentations, etc. It is the latest trend in teaching-learning as it is a powerful tool for evaluating student's performance. The teacher would be in a better position to gauge the student's performance easily.

To prepare the assignments, children refer to different websites, download images, etc. Then, they prepare it for MS Word or PowerPoint presentations. The assignment prepared by the student in digital format could be converted in the e-portfolio of that particular student.

There are a number of tools where teachers can place the digital information of student's work. To create an e-portfolio, the first step is to sign up on any particular website. This will generate an account on that particular website. Thereafter, start recording the digital works of children.

Some websites are-

www.pebblepad.co.uk

www.portfoliogen.com

www.mahara.org

www.rcampus.com
www.digication.com, etc

According to Lorenz and Ittelson, "e-portfolio is a valuable learning and assessment tool. It is a digitised collection of artifacts including demonstrations, resources, and accomplishments that represent an individual, group, or an institution. This collection can consist of text based graphic, or multimedia elements archived on a website or on other electronic media, such as CD-ROM or DVD. It is more than a simple collection of data. It can also serve as an administrative tool to manage and organise work, created with different applications and to control who can see the work. It encourages personal reflection and is often involved in the exchange of ideas and feedback".

Types of E-Portfolios

Generally, online portfolios function with the help of the internet while other formats do not require the internet.

They are classified into three categories as-

- I. **Developmental E-Portfolio** It collects and records student's activities. For example, a project of two months is assigned to students as a learning activity. During this period, they have to submit short reports every 25 days in MS Word format. Such a digital report will be stored in the database of e-portfolio. Thus, developmental e-portfolios record activities over a period of time. The primary objective of recording the progress is to communicate the progress to the students and the teachers.
- II. **Assessment E-Portfolio** It collects and records children's activities for the entire duration of the programme or course. The primary objective is to assess and judge the competency of children in specific skills and programmes. These portfolios are submitted for assessing and evaluating the performance in a learning activity. For example, digital formats of assignments submitted during studies in primary class.
- III. **Showcase E-Portfolio** These portfolios exhibit exceptional works and skills of an individual. This may include work in preparing reports, inserting graphics and pictures in preparing write-ups, development of quality video and audio clips and so on. These portfolios judge one's performance, selection to a job, etc. Thus, as the name indicates, showcase e-portfolios are images of an individual's persona.

ICT for Research

The application of ICT is of an immense importance and powerful in the research function. The increase in computing power has made it possible to conduct complex calculations on large data sets. Communication links make it possible for research teams to be spread across the world instead of concentrated on a single institution. The combination of communications and digital libraries is equalising access to academic resources, greatly enriching research possibilities. Computer data processing not only free researchers from the cumbersome task of manually analysing data, but more importantly facilitates quick and accurate analysis of large amounts of data from national samples or even multi-national samples, covering tens of thousands of respondents.

One more important dimension of ICT in research is the use of online full text databases and online research libraries/ virtual libraries, which are the direct outcome of the growth in tele-communication's networks and technology. These databases and libraries provide researchers with online access to the contents of hundreds of thousands of books from major publishing houses, research reports and peer reviewed articles in electronic journals.

Some examples of ICT in research are

- Online repositories
- Online libraries
- Online assessment tools
- Offline assessment tools

Online Repositories

Online or digital repositories are systems that enable the storage, discovery and retrieval of meta-data or electronic materials, stored at a local or distributed level. Learning Object Repositories (LOR) are systems that manage the access to reusable learning content. The purpose of the repository is not only to store catalogued learning materials and distribute them, but also to allow sharing and reuse. The material distribution and sharing circle's model categorises three main types of online learning material repositories. The first are local repositories, containing learning materials and meta-data about these materials. These repositories can be found in many institutions that develop and store learning materials for their own community. These repositories were established to serve local communities and answer specific pedagogical needs. Therefore, the learning materials they gather were developed according to the learner's needs in order to improve the process of learning. They are normally designed by experts that are aware of the institution and the learner's needs. The second type of repository is portals that allow access to several online repositories, such a MAOR, MERLOT and open courseware consortium. These portals contain only the meta-data and allow a wider use of learning materials developed and stored in local repositories. These fields describe the material and the possibilities for its use, so that objects may be located using keywords, retrieved and examined to see whether it suits the learner's needs or not. The third type is international associations and consortiums that enable the sharing of learning materials among repository networks worldwide. Consortiums such as globe, enables users to broaden their search between international repositories, according to meta-data standards via automatic content harvesting or search request as sharing of learning materials.

These consortium's features, which characterise objects and include information fields describing materials, expand the use of learning materials by retrieving these materials via modular construction of materials and their integration into new learning processes, according to learner's needs.

Learning materials repositories provide a platform for the sharing of educational resources on the web. Many repositories are effectively created by their users and offer tools that enable users to publish their opinion and comments regarding the learning materials whether by vote, frequency of use or peer review. Using these tools, one may learn of an object's quality or receive other users recommendations of the best ways to use materials.

User's involvement and exchange of information between learners, creates a learning community that shares information of great value. The combination of different evaluated learning material offers the learner an effective and high quality learning process. Community members' involvement in the

repository environment increases the motivation to use the learning materials and to support the community by passing on valuable informal knowledge to other users.

Online Libraries

According to R. Smith, "Digital libraries are a controlled collection of information bearing objects that are in digital form and that they may be organized, accessed, evaluated and used by means of heterogeneous and extensible set of distributed services that are supported by digital technology".

A digital or online library is popularly viewed as an electronic version of a library where storage is in digital format, allowing direct communication to obtain material and copying it from a master version. It combines remote technology and information resources, to allow access and breaking down the physical barrier between resources. Now, the internet is becoming an integral part of library services. The Internet has empowered the libraries to develop new services and resources and provide them at a global level.

Internet based library services can be provided in the following ways-

- Access to library holdings through web-OPACs (Online Public Access Catalogues) and provision of circulation services through the library website.
- Access to licensed online databases, full text journals and ebooks.
- Library gateways and portals to provide access to non-library materials.
- Virtual reference and information services.

Thus, in comparison to traditional libraries, digital libraries provide efficient and qualitative services by collecting, organising, storing, disseminating, retrieving and preserving the information. It provides online access to historical and cultural documents whose existence is endangered due to physical decay.

The major areas which offer digital libraries are information retrieval, multimedia database, data mining, data warehouse, online information repositories, image processing, hypertext, World Wide Web (WWW) and Wide Area Information Service (WAIS).

Libraries have played a significant role in society and digital libraries with the promise of breaking the barriers of geographical distance, language and culture, and even have more potential to significant social roles. Digital libraries will not only change our reading and information habits, but they are also going to bring major changes in the economic models of information generation, distribution and management functions. For exploring the benefits of digital libraries in Indian languages there is an urgent need of tools and applications, such as OCRs and Machine Translation Systems, so that users can take benefit of reading rare classics that can be published in any language and researchers are able to use these tools for their linguistic research. about the develsen er der

It will boost the development of lexical and terminology databases with the combination of quantitative and qualitative analysis of text. Commemorate Text analyser is a new kind of tool which is helpful in lexicography, knowledge acquisition, language and writing variation studies. Digital library creation has been a good test bed for OCRs and now the world is moving towards speech to speech translation, all these tools together will help in building one for Indian languages.

Assessment Tools

Assessing a student's performance is an integral part of the teaching-learning process. A lot of assessment techniques are available. Effective assessment is a continuous process and it is not simply that has to be done at the end of a unit. Evaluation is integrated into all aspects of the curriculum, thus, providing both students and teachers useful and relevant data to gauge progress of students. Not only teachers, but also students play an important role in assessing their own learning progress.

An assessment tool is a complete set of documentation needed to assess at one or more units of competency. Each assessment tool must include two to three instruments that each support different methods of assessment (e.g. checklist, observation and questioning).

There are various tools and techniques to assess student's performance, such as-

- Online assessment tools, like online surveys, instant feedback, online tests, etc.
- Offline assessment tools, like checklists, rating scales, observations, etc.

Online Assessment Tools

Online assessment tools are online tests conducted with the purpose of evaluating, measuring and documenting the academic readiness, learning progress, skill acquisition or educational needs of the test takers.

There are a lot of reasons to use educational technologies for student's assessments, such as saving time, making the learning process more comprehensive and friendly, offering fast feedback, etc. The students can pre-check their assignments before submitting them, which saves the teacher's time for the actual grading. Also, there will be no stacks of papers on the table, no lost tests, no need to take all the assignments home.

Digital assessment tools ease the lives of both teachers and learners. Due to modern technologies, students can get answers to their questions without any need to interrupt each other. All their activities can be tracked by the teacher, instantly. Also, digital testing is fun for students, which creates a better learning environment, due to which an interested audience will make teaching easier and more desirable for learners.

Various Online Assessment Tools

Gamifying the Answers One of the most popular tools for digital assessments is Kahoot. This gamification platform helps teachers to build the learning process in the form of a game by creating Multiple Choice Questions or using already existing games.

which literate people are exposed in order to observe their verbal behaviour under these stimuli".

The teacher can upload media files and images to create a unique game or download readymade stuff. Though every student needs to work on their personal computer to pass the test, this is a great group activity, as all questions are shown on a shared screen and may be discussed if needed. Kahoot provides 100% engagement in the class, so that students totally get plunged into the competitive atmosphere to win.

The ideal solution to get a brief and to the point feedback from a group of learners is Answer Garden. This simple online tool is focused on the (quick) question-answer interaction between learners and their teachers. After the teacher has shared a question in the class, students can either start forming an answer or to choose the right one from a multiple choice, provided by the teacher.

The speed of collecting data is really impressive in Answer Garden, but unfortunately it has limited online time. Therefore, this tool is not suitable for all types of questions. Teachers should avoid too long questions, as they demand even longer answers.

Giving Instant Feedback The software 'socrative' equipped with various features that can be used by educators for many different purposes. It also includes activities, like quiz, quick questions, exit tickets, etc. Socrative has an intuitive, colourful and easy interface and apps for both students and teachers. The tool allows educators to get an immediate insight into their student's understanding in real-time, as they can create quizzes in seconds and can also share them with other teachers. is

Tracking Progress Plicker is another real time educational software allowing to get data for an assessment. It is a comprehensive tool that helps teachers to understand exactly whether their students are in terms of progress or not. Though plicker is a serious tool for digital assessment, many students consider it to be a fun game, which makes the studying process even easier.

The results may be seen in two modes i.e. student's mode and graph mode. The graph mode allows a teacher to explore how learners make their decisions, while the students mode helps learners to track their correct and incorrect answers.

Online Survey Tools or Test Generators A widely used tool for student's assessments is Google Forms. It allows teachers to create Multiple Choice Questions in the form of a survey and enhance it with images and videos in a few minutes. They can also add collaborators to their google forms and together can work on a survey.

Mail Questionnaire According Lundberg, "Fundamentally, the questionnaire is a set of stimuli, to which literate people are exposed in order to observe their verbal behavior order these stimuli. It is a period list of questions sent through mail to respondents and to be returned by the respondents after filling up the questionnaire.

As the name indicates, "questionnaire is a set of selected questions, whose answers the researcher seeks from respondents in order to gain knowledge about certain specified matters". Since, the questionnaire has to be answered after reading, it is obvious that a questionnaire can be addressed only to literate people. The limitation of mail questionnaires is that it lacks personal contact and might result in incomplete responses.

Thus, there are many digital assessment tools that serve different purposes in the educational environment. Teachers have to choose the best tool which will be useful in tracking their student's progress and to provide them with more objective feedback and grades.

Offline Assessment Tools

Offline Assessment tools are offline tests which are conducted within the classroom. It is a systematic approach to formative evaluation used by instructors to determine how much and how well students are learning.

Some of the offline assessment tools are discussed below-

Observation Assessment Tool

Observation is a very useful way to assess but as with all assessment tools, it needs to be well planned and designed. It is selective and purposeful. It gives clear instructions to both the assessor and candidate about how to do the assessment.

Steps in Observation

Selection of the Topic This refers to determining the issue to be studied through observations.

Formulation of the Topic This involves fixing up categories to be observed and pointing out situations in which cases are to be observed.

Research Design This determines identification of subjects to be observed, preparing an observation schedule if any arranging situations to be observed.

Collection of Data This involves familiarisation with the setting, observation and recording.

Analysis of Data The researcher analyses the data, prepares tables of the final report throughout the research process.

Report Writing This involves writing of the report for submission

Portfolio Assessment Tool

Portfolio assessment can be a flexible way to collect a range of evidence. It guides the assessor on how to make the final assessment decision. There are clearly defined purpose and learning targets in this assessment. It showcases what students are capable of doing.

Three main features of portfolio assessments are -

- Students must be actively involved in the process of selecting work to be included.
- Students must actively engage in self-reflection.
- Collection of student work must have a specific purpose.

Portfolios allow for direct input from students. It often requires a self-evaluation component such as reflective essays that let students describe their overall experience in the class and the portfolio creation process. It helps students practice critical thinking, letting them decide how well the portfolio measures up to the course goals and standards.

Sociometry

It is a technique for describing the social relationships among individuals in a group. It attempts to describe attraction or repulsion between two individuals. In education, it is commonly used in schools.

Children are asked to name in order of preference (usually two or three) the child or children that they would invite to play, sit next to, work on a class assignment, etc. It is also common to ask children to name the children again in order of preference, that they would least like to invite to play, sit next to or work on a class assignment. It is a kind of peer rating technique. Often, sociometric choices are represented graphically on a chart known as sociogram.

Psychological Tests

These tests are the useful and most frequently employed tools of educational research. They are used to describe and to measure a sample of certain aspects of human behaviour or inner qualities. They provide the data for most experimental and descriptive studies of education. They yield objective and standardised descriptions of some psychological aspects of an individual's personality and translate them in quantitative terms.

There are various kinds of psychological tests, like achievement test, aptitude test and an inventory as discussed below-

(i) **Achievement Test:** It is an important tool in school evaluation and has great significance in measuring instructional progress and progress of the students in the subject area. It is directly related to the pupil's growth and development in educational situations. Thorndike and Hagen held that "it is a systematic procedure for determining the amount a student has learned through instructions". It provides a basis for promotion to the next grade.

(ii) **Aptitude Test:** These are assessment tools to measure the performance of an individual. It measures an individual's skills, tendencies and performance achievement in a specific field. It is of great importance for the students studying in the school. The test will give them a precise result of what is the actual abilities of a person. If the students practice aptitude tests from the very beginning they will be able to solve them in a proper time.

(iii) **Inventory:** A concept inventory is a test to assess students' conceptual understanding in a subject area. It consists of Multiple Choice Questions in which several items are used to evaluate understanding for each concept. It is a screening device that gives the teacher a glimpse into the ways that students think about the key concepts in a subject area and not simply a test that indicates correct and incorrect answers. Teachers can use the results to plan instruction and also monitor changes in student's understanding.

Online Survey Tools or Test Generators

In utilising an online interface, online survey tools provide a quick, easy and cost effective means of delivering surveys and analysis of the results yielded through one centralised system. It allows the user to easily define and design the survey's questions and send web-links to prospective respondents.

A test generator is a software used to create tests for a variety of uses.

Applications of Online Survey Tools

Give Writing Prompts and Collect Responses By incorporating a login action into a survey, teachers can allow each student to sign into the assignment and be individually identified. A summary report may show how many students completed the assignment and who is lagging behind.

Give a Quiz or a Homework Most survey tools have a quiz score action which will collect responses and then grade on a percent basis.

Make Assignments Adaptive With survey logic, you can keep asking progressively more difficult questions to create your own adaptive quizzes.

Keep in Touch with Parents At the beginning of the year, teachers can collect parent's information and import it into your survey tool's email campaign.