

**TWO-YEAR
POST GRADUATE DEGREE PROGRAMME
IN
EDUCATION
SEMESTER– III**

COR-313

Educational Technology

Self Learning Material



DIRECTORATE OF OPEN AND DISTANCE LEARNING

UNIVERSITY OF KALYANI

KALYANI – 741 235, WEST BENGAL

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Director's Message

Satisfying the varied needs of distance learners, overcoming the obstacle of distance and reaching the unreached students are the threefold functions catered by Open and Distance Learning (ODL) systems. The onus lies on writers, editors, production professionals and other personnel involved in the process to overcome the challenges inherent to curriculum design and production of relevant Self Learning Materials (SLMs). At the University of Kalyani a dedicated team under the able guidance of the Hon'ble Vice-Chancellor has invested its best efforts, professionally and in keeping with the demands of Post Graduate CBCS Programmes in Distance Mode to devise a self-sufficient curriculum for each course offered by the Directorate of Open and Distance Learning (DODL), University of Kalyani.

Development of printed SLMs for students admitted to the DODL within a limited time to cater to the academic requirements of the Course as per standards set by Distance Education Bureau of the University Grants Commission, New Delhi, India under Open and Distance Mode UGC-DEB Regulations, 2020 had been our endeavour. We are happy to have achieved our goal.

Utmost care and precision have been ensured in the development of the SLMs, making them useful to the learners, besides avoiding errors as far as practicable. Further suggestions from the stakeholders in this would be welcome.

During the production-process of the SLMs, the team continuously received positive stimulations and feedback from Professor (Dr.) Amalendu Bhunia, Hon'ble Vice-Chancellor, University of Kalyani, who kindly accorded directions, encouragements and suggestions, offered constructive criticism to develop it within proper requirements. We gracefully, acknowledge his inspiration and guidance.

Sincere gratitude is due to the respective chairpersons as well as each and every member of PGBOS (DODL), University of Kalyani. Heartfelt thanks are also due to the Course Writers-faculty members at the DODL, subject-experts serving at University Post Graduate departments and also to the authors and academicians whose academic contributions have enriched the SLMs. We humbly acknowledge their valuable academic contributions. I would especially like to convey gratitude to all other University dignitaries and personnel involved either at the conceptual or operational level of the DODL of University of Kalyani.

Their persistent and co-ordinated efforts have resulted in the compilation of comprehensive, learner-friendly, flexible texts that meet the curriculum requirements of the Post Graduate Programme through Distance Mode.

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Director
Directorate of Open and Distance Learning
University of Kalyani

Syllabus
Full marks - 100

SEMESTER – III		
COR-313: EDUCATIONAL TECHNOLOGY		
Block	Contents	Study hours
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	Unit - 2: ICT and Instructional Technology 1.2.1: Concept of Information Technology, Information and Communication Technology and Instructional Technology	1 Hour
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COR-313

EDUCATIONAL TECHNOLOGY

Block-1

Introduction to Educational Technology

CONTENT STRUCTURE:

Introduction

Learning Objectives

1: Basic Concept of Educational Technology

1.1.1: Meaning, Nature of Educational Technology

1.1.2: Scope of Educational Technology

2: ICT and Instructional Technology

1.2.1: Concept of Information Technology, Information and Communication Technology and Instructional Technology

3: Application of Educational Technology

1.3.1: Educational Technology in Formal Education System

1.3.2: Educational Technology in Non-Formal Education System

1.3.1: Educational Technology in Informal Education system

1.3.2: Educational Technology in Inclusive Education system

Let us sum up

Assignment

Suggested Readings

INTRODUCTION:

In the first part of the 20th Century there was a sudden and tremendous change in the thinking pattern of man. This is partly due to the discovery of Quantum Theory by Max Planck (1901) and Special Theory of Relativity by Albert Einstein (1905) and partly due to the increased application of science and technology in everyday life. Improvement of wireless systems and space craft technologies has improved radio and telecommunication hardware and software systems also. Development of low cost T. Vs and computers have widened the imagination of the world of human being. Now day's most modern information technologies have changed the distance of the world. This world has now become a 'Global Village'.

Education is a social process. On the one hand it changes society, and on the other hand education changes itself with the change of the society. So it is obvious that these would change educational methods, instructional systems and, curriculum and evaluation procedures. Exactly this is what has happened today. This Block will give you some basic ideas of Educational Technology.

With regard to communication, education, economic prosperity, domestic activities, and the urgent problem-solving aspects of existence, technology has become an indispensable part of modern living. During the epidemic, people deeply understood the value of technology, particularly in the area of education. Technology in education was formerly only used in a small area, but the quick development of information and communication technology has changed the field's widespread use. Technology's role in a traditional educational setting is to facilitate knowledge and skill education through improved efficiency and effectiveness. In essence, the literacy, post-literacy, and awareness-raising initiatives are run by the Non-Formal Education Center. Additionally, it carries out initiatives for ongoing education throughout life, skill improvement, and income production. As a result, technology is now used much more in both traditional and formal educational institutions as well as non-formal education. In this unit, detailed application of technology in formal as well as non-formal education will be discussed.

A generic phrase for education that might take place outside of a set curriculum is "informal education." Although informal education is not just found in traditional classrooms, it does include student interests within a curriculum. It functions through discussion, experience exploration, and expansion. There is occasionally, but not usually, a direct objective

connection to some bigger picture. Giving students the resources they need to eventually master more complex topics is the aim. It can be used to describe a number of alternative educational practices, including unschooling or homeschooling, self-teaching, and youth work. Informal education involves both unintentional and intentional methods of working together to learn new material. It aims to close the gaps between conventional classroom settings and other learning environments, and can be discussion-based.

LEARNING OBJECTIVES:

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

- ❖ Give the Meaning, Nature and Scope of Educational Technology (ET)
- ❖ Understand the Information Technology, Communication Technology & Information, Information and Communication Technology and Instructional Technology
- ❖ Explain the Educational Technology in Formal, Non-Formal, Informal and Inclusive Education system

Block-1

Unit – 1

Basic Concept of Educational Technology

1.1.1: MEANING AND NATURE OF EDUCATIONAL TECHNOLOGY:

Education always undergoes multi-dimensional changes.

According to Erie Ashby (1967) there were four major revolutions in Education:

1. The first revolution was the change of adult role in the society and shifting responsibility of education from parents to teachers and family to school.
2. The second revolution was the adoption of written word instead of oral instruction in education and the development of classroom concept.
3. The third revolution was the invention of printing and wide spread of printed books and
4. The fourth revolution is the advancement of electronics; the use of radio, T. V., computer, tape-recorder etc.

The behavioural scientists have joined in this fourth revolution. We are now in the midst of a fifth revolution. It is the revolution of 'Information Technology'. "Any technology", says Ashby, "which increase the fate of learning, would enable the teacher to teach less and the learner to learn more."

The perceptions of what constitute Educational Technology have evolved over a period of 30 years. [Elton, et. al., 1993]

The term technology refers to the combination of both techniques and technical innovations. In fact techniques are related to software and equipments are hardware of technology. The hardware component is the physical device and methodologies are the soft component components.

As the term technology is distinctly connected with education, it has some special connotation for use and explanation in education. Some time it was thought that Educational technology is the combination of Technology of education and Technology in education. But now- a- days it is thought that E. T. is more than the combination of these two terms. Technology in education is the hardware part of the education system and the technology of education is the software part and it includes techniques and mythologies of the teaching-learning process. Before going further, let us define some of the definitions of ET. According to the National Council for Educational Technology (NCET) UK (1971):

“Educational Technology is the development, application and evaluation of systems, techniques and aids to improve the process of human learning.”

Educational Technology is the development, application and evaluation of systems, techniques and aids to improve the process of human learning.

This is a precise but stimulating definition of E. T. But a more elaborate definition of E. T. was given in the International Seminar on Alternative Strategies for Introduction of ET in Budapest (1976) and it was also accepted by UNESCO and UNDP. The definition is as follows:

“ET may be defined as a separate field in the theory of Education dealing with development and application of the use of educational resources. In detail it implies the following principles:

1. Clear educational objectives;
2. The logical order of the elements of content;
3. The structure of the teaching learning process;
4. The development of models leading to the acquisition of knowledge;
5. The introduction of feed-back with the teaching learning process;
6. Media selection and criteria of media selection, also media evaluation and optimization;
7. The development of equipment to meet educational, economic, aesthetic and technical demands;
8. The study of the effectiveness of hardware and software in practical situations;
9. The various approaches to effectiveness in educational systems;”

Another definition given by the Commission of Instructional Technology (USA) is as follows “Education technology is a systematic way of designing, implementing and evaluating the total process of learning and teaching in terms of specific objectives, based in research on human learning and communication and employing a combination of human and non human resources to bring about more effective instruction.”

So from the above definitions it is very clear that the primary objective of ET is improving the efficiency of the process of learning. It uses modern technology and technicalities for the development of teaching and learning systems.

In a practical learning situation, conventional or distance education, a learner acquires knowledge through different instructional modes. These modes of instructions may be in form of oral communication or pictures, films, discussions, laboratory work, home assignment, etc. ET has its application in all the cases. It helps to chose effective media for

different circumstances of instruction according to the characteristics of the pupil, their attitudes towards the subject matter, instructional objectives, class size, etc.

NATURE OF EDUCATIONAL TECHNOLOGY:

We have briefly discussed the forms of ET. This has given us a synoptic view of the development of ET in the passing of the age. We can now try to explain the nature of ET on the basis of the above discussion. Different persons may consider the nature of ET in different angles, because it covers a vast area in the field of education. Some have considered the nature of ET from the following stand points:

1. Evolution of the concept of ET.
2. Existing position and concept of ET
3. Distinction of ET from other related concepts.

Earliest concept of ET was linked with the use of audio visual aids like charts, models, maps etc. In this sense the term ET was used as a synonym to audio-visual aids. But with the development of science and technology and consequently the development of electronic devices, ET got a new boost. At this stage sophisticated hardware and software like projectors, tape recorder, radio and TV were used.

The development of mass media has further increased the capability of ET. In this age the use of radio, TV, tele-text, CAI, etc. has increased the reach of ET in formal and non-formal education. Again with the development of sophisticated programmed instruction concept helped to develop self learning and self instruction process. Thus use of teaching machine and computers came in to the field of teaching and instruction in a big way for preparation, design and development of self learning modules and self learning materials. With this development, there is a change in the in the approaches and applications of ET. New theories of teaching along with the new theories learning were applied in the area of teaching, learning and instruction. Thus micro teaching, behaviour analysis of learners and teachers, systems approach came in to existence.

Thus we can now differentiate among different terms like Educational technology and Instructional technology; Educational technology and Teaching technology; Technology in education and Technology of education, etc.

Thus the nature of ET can be summarized as follows:

- i). ET is the application of scientific principles to education.
- ii). ET stresses on the development of methods and techniques for effective teaching and learning.
- iii). It stresses the organization of learning situations for the effective realization of goals.
- iv). It gives importance of designing and measuring instrument for testing educational outcomes.

- v). It can control outcomes of education by controlling media, methods and environment.
- vi). It involves input, process and output aspects of education. Thus ET also involves in system approach in education.
- vii). It also helps communication in education.

1.1.2 SCOPE OF EDUCATIONAL TECHNOLOGY:

An oft going proverb says like this:

I hear, I forgot;

I see, I remember;

I do, I understand.

The traditional teachers depend too much on verbal exposition. Without proper and pragmatic visualization the pupil cannot remember and understand them. But due to binocular vision of human being, they can minutely see matters and differentiate them accurately. So one can remember what one can see. Again practical activities involve most of the organs of the body and proper understanding develops through the use of sense organs.

It has been experimentally found that we learn-

1% through TASTE

1.5% through TOUCH

3.5% through SMELL

Again we remember-

11.0% through HEARING

83.0% through SIGHT

According to Henry Elton (1993) the scope of ET has been expanding after the World War II. Elton said that the scope of ET has expanded from mass Communication to Individualised learning and then Group learning by the use of Research, Development and Use.

20%	of	what	we	HEAR
30%	of	what	we	SEE
50%	of	what	we	SEE & HEAR

80%	of	what	we	SAY
90%	of	what	we	SAY & DO

So one can certainly say that E. T. has tremendous scope in the educational field because ET uses scientific and technological methods and concepts developed in psychology, sociology, communication, linguistics and also uses the management principles of cost effectiveness and efficiently use and deploy available resources in men and materials.

Scope of ET expanded further by the development of programmed instruction. This development enhances the scope of individual learning. Skinnerian psychology has been applied to produce books and text materials based on programmed instructions. Application of computer in education has improved individualised learning at a faster rate than our previous assumptions.

Group learning technique has begun to expand its areas in the early 60's by the development of humanistic psychology by Carl Rogers. Simulation, role play, case studies are some of the group learning techniques developed in this period.

Thus scope of ET is expanding day to day with the advancement of research and development in the field of education.

The scope of ET may be summarized as follows:

- i) E. T. helps to solve educational problems through systems approach. Because educational problems are multivariate in nature.
- ii) E. T. can be applied in developing instructional objectives and techniques. In this case it takes the help of psychological researches.
- iii) By the use of multimedia approach in teaching and learning ET can develop higher cognition among children and adults.
- iv) By the application of information and communication technology ET has developed multi-sensory approach in education. This approach increases the retention time in learning process. Thus it increases the scope of research and development in education in this field.
- v) Development of programmed instruction by ET, individualized learning has placed its foot firmly. Thus it has extended its scope in other fields of personalized learning, viz., self learning modules, multimedia learning packages, etc.
- vi) It uses the modern electronic gadgets, viz. projectors, audio & video equipments, C. C. TV, VCR, TV monitors, radio, computers, etc. Thus it relieves, to some extent, teachers on the one hand and encourages learners on the other hand. These hardware and software technologies

also expand the area of research, development and use in different field of education.

- vii) E.T. can now expand and change teachers' skills, attitudes and behaviours.
- viii) ET has tremendous scope in setting goals, development and reform curriculum, try out of new methods and materials in a particular situation.
- (i). According to Spaulding, S. (1971), "Although education has shared in the creation of technological age, education itself has not learned how to use the fruits of technology to improve the efficiency and the quality of its own institutions." [Advanced Educational Technologies, Prospects in Education, UNESCO, 1971]

Let Us Check Our Progress

1. State four characteristics of Educational Technology.
2. What are the five approaches to Educational Technology?

Block 1

Unit-2

ICT and Instructional Technology

1.2.1: Concept of Information Technology, Information and communication technology and instructional technology:

CONCEPT OF INFORMATION TECHNOLOGY:

Technology has been defined as "systematic knowledge and action, usually of industrial processes but applicable to any recurrent activity". In providing tools and techniques fraction, technology at once adds to and draws from a knowledge base in which theory and practice interact and compact. At its most general level technology may be regarded as definable specifiable way of doing anything. In other words, we may say a technology is acodified, communicable procedure for solving problems. Technology, Manfred Kochen observed impacts in three stages. First, it enables us to do what we are now doing, but better, faster and cheaper; second, it enables us to do what we cannot do now; and third, it changes our life styles. Information technology is a recent and comprehensive term, which describes the whole range of processes for generation, storage, transmission, retrieval and processing of information.

The development of man-made information technology has been a sluggish one for the past 5,000 years. With prehistoric signs, hieroglyphics, the alphabet, book printing, and computer typesetting – a more or less linear development – it has followed the mechanical and subsequently electronic road rather than the biological one. The telephone, radio, television, satellite transmission, transistor, computer, and microprocessor represent distinct qualitative changes in information technology that have only recently come to light. As a result, we now have to accept the umbrella term "information technology" as a catch-all for a wide range of new advancements. Information technology, according to some, is the study of how information is handled, particularly when it comes to computers that are used to facilitate knowledge transmission in the social, economic, and technical sciences.

Definition of Information Technology (IT):

Different definitions exist for the word "Information Technology" (IT). The definition of information technology (IT) in the Macmillan Dictionary of Information Technology is "the acquisition, processing, storage, and transmission of audible, visual, textual, and numerical

information through a computing and communications system based on microelectronics. Regarding this definition, two aspects merit consideration:

1) The creation, recording, and processing of information, not only its transmission, is considered as involving the new information technology. These are components of the communication process that can be divided (analytically and practically), but in the context of human communication, they frequently overlap.

2) There are many different ways to display information in modern information technology. It includes not just textual (cognitive, propositional, and verbalized forms, which are what we typically consider to be information), but also graphical, aural, and numerical representations.

Information technology is defined by UNESCO as "scientific, technological, and engineering disciplines, and the management techniques used in information handling and processing, their applications; computers and their interaction with man and machine, as well as related social, economic, and cultural matters." (Stokes) While highlighting the crucial role that computers play, the communication systems do not appear to fall under the ambit of this description. On the other hand, it may be argued that communication systems are just as crucial to information technology as computers are. We now have a convergence of three technological strands: computers, microelectronics, and communications. In other words, new electronic dimensions for information management have been provided through a mosaic of technologies, products, and approaches. New information technology is the name given to this mosaic. It is crucial to keep in mind that information technology encompasses a far wider range of informational activities than merely new pieces of equipment. Computers, books, prints, reprography, telephone networks, and broadcasting are all included in information technology. In the following sections let us briefly consider the major components of information technology namely: computer technology, communications technology and reprographic and micrographic technologies.

CONCEPT OF INFORMATION AND COMMUNICATION TECHNOLOGY:

It is stated that experience is a great teacher. The student may acquire this experience both directly and indirectly. Direct contact with the source is not always feasible or preferred as a means of getting firsthand knowledge. As a result, the majority of what we learn is based on information we have heard about certain things, places, people, ideas, or events. This knowledge serves as a foundation for our knowledge and comprehension of them and the

environment in which they live. To do this, the learner must be able to develop the skill of gathering knowledge, storing it, and using it as needed. Such activities are regarded as being integral to information technology (IT). Without the use of the art of communication, however, the use and access to the information remain incomplete. Sharing ideas, thoughts, views, and facts with others is communication as a two-way process. As a result, the mutual exchange between the information's source and recipient tends to enhance its growth, comprehension, and application, all of which eventually aid in knowledge construction.

Origin and Growth of Information and Communication Technology-

As old as human civilization it, communicating, gathering knowledge, and applying it for a certain goal all go hand in hand. The earliest method of doing things was verbally, storing them in the memory, and transmitting them orally to the user in the absence of instruments and means. In this sense, the development of paper and ink must be seen as the initial ICT innovation. The movable type (developed by Gutenberg in Germany in 1438) is one scientific development that offered better tools for this aim. The growth of ICT has also been greatly aided by the print media. The following list includes some of the cutting-edge technological advancements that aided in the task of ICT. Some of the advanced technological development that helped in the task of ICT is outlined below-

- ❖ Photography in 1849, by a Frenchman L.G.M. Daguerre and an Englishman W.H.F.Talbot.
- ❖ Photostat in 1900, by Professor Abbe Rene Graffin of France.
- ❖ Xerography in 1938, by Chester F. Carlson of U.S.A.
- ❖ Micrography (obtaining copies of the recorded material in highly reduced format) in .1940, by an Englishman J.B. Dancer and Frenchman Rene Dagraan.
- ❖ Laser technology (used for printing and memory device) in 1960 by Theodore Maiman of U.S.A.
- ❖ Magnetic video camera, video disc and computers developed in the 20th century.

In addition to this, the development of ICT has greatly benefited from developments in the field of telecommunications technology. We have now entered the era of satellite communication, which began with the use of pigeons to deliver messages. The following are some of the development's landmarks:

- ❖ Telegraph invented by S.F.B. Morse of U.S.A. in 1837
- ❖ Telephone invented by Alexander Graham Bell of Scotland in 1876.

- ❖ Radio invented by G. Marconi of Italy in 1895.
- ❖ Television invented by J.L. Baird of Scotland in 1925.
- ❖ Development of communication satellites (first satellite Sputnik was launched by U.S.S.R. on 4th Oct. 1957) and cable and facsimile transmission (Fax) technology in the 20th century.

In the latter half of the 19th century, attempts were made to exert scientific control over the process of information and communication using modern inventions in the fields of information collection, storage, retrieval, transmission, and exchange. The credit for the successful management of the exchange of scientific information between the scientists there and other foreign countries belongs to the United States, where the term "information science" (later renamed information and communication technology) was first presented in 1950. These information science services' intended targets include the following:

1. To offer or set up the offering of indexing, abstracting, translating, and other services that promotes the more efficient diffusion of scientific knowledge.
2. Launching initiatives to create new and improved systems, such as automated ones, for providing users with access to scientific data.

The management of textual data and bibliographic records in the scientific field was once the main thrust of ICT. Later, about 1960, it was also used in the industrial sector. At this point, methods and systems assisted by computers were created for information and communication needs. In later years, the use and application of ICT could no longer be restricted to the fields of science and industry, but instead gradually expanded to include other operational fields, areas, and professions like banking, management, education, medicine, and healthcare, as well as government agencies, the legal and judicial systems, the police and military establishment, and others. Because of this, we are now using it in our classroom teaching-learning, distance learning, and online learning, creating virtual classrooms.

Traditional and Modern ICTS:

As we can visualize through the previous discussion ICTs are in vogue from the olden days. So, these can be classified as traditional and modern.

Traditional ICTS-

The traditional ICTs may include the following means and media:

- ❖ Printed media in the form of textbooks, resource books, journals, news items and

- ❖ Other literature available in the school and public libraries. Verbal information and ideas exchanged with the peers, teachers, parents and other members of the society.
- ❖ Graphical material such as pictures, charts, maps diagrams, posters and cartoons.
- ❖ Three-dimensional aid material such as specimen, model, puppetry, and mock up.
- ❖ Audio-visual hardware equipment like radio, television, slide projectors, overhead projectors, motion pictures, tape recorder, audio-video recording device and teaching machines.

Modern ICTS-

The modern ICTs are not single technologies like the traditional technologies. They are a combination of hardware and software, media and delivery systems. In addition, they have gone digital. Some of these may be named as below:

- ❖ 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 large group 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 Computer mediated conferencing-video and audio conferencing
- ❖ Video text, tele-text, interactive video text, interactive video disk (IVD) and interactive
- ❖ remote instruction (IRI)
- ❖ Idea of virtual classroom and virtual reality.

CONCEPT OF INSTRUCTIONAL TECHNOLOGY:

The term “Instruction” refers to systematically organized programme designed to produce certain knowledge, skill, understanding, attitude, and behaviour patterns among learners.

The term “Technology” refers to systematic application of scientific or other organized knowledge to practical tasks.

The term Instructional Technology refers to multiple opportunities for cooperative learning. Instructional Technology is mainly the practice of using technology for educational reasons. While Information Technology is a broad-based term familiar to the business community, Instructional Technology is a little more uncertain. Instructional technology is the branch of education concerned with the scientific study of instructional design and development. The main purpose of instructional designers is to create engaging, effective learning experiences. A technology of Instruction is thus a particular systematic arrangement of teaching learning events designed to put the knowledge into practice in a predictable effective manner so as to attain specific objectives.

Block-1

Unit-3

Application of Educational Technology

1.3.1 EDUCATIONAL TECHNOLOGY IN FORMAL EDUCATION SYSTEM:

Educational technology has a significant impact on formal education systems, transforming the way students learn, teachers teach, and schools operate. Here are some key applications of educational technology in formal education:

1. Digital Learning Resources: Educational technology provides access to a wide range of digital learning resources, including e-books, online libraries, educational websites, and multimedia content. These resources enhance traditional textbooks and enable students to explore concepts, engage with interactive materials, and access up-to-date information.

2. Interactive Presentations and Multimedia Tools: Technology enables the creation of interactive presentations, multimedia content, and educational videos that engage students and facilitate visual and auditory learning. Teachers can incorporate multimedia elements into their lessons to explain complex concepts, illustrate real-world examples, and make learning more engaging.

3. Learning Management Systems (LMS): LMS platforms are widely used in formal education to manage course content, assignments, assessments, and grades. Teachers can create online classrooms, share resources, and communicate with students and parents through these platforms. LMS also allows for tracking student progress and providing timely feedback.

4. Collaboration and Communication Tools: Educational technology fosters collaboration and communication among students and teachers. Tools such as video conferencing platforms, discussion boards, and messaging apps enable real-time interaction, group projects, and remote learning. These tools promote student engagement, peer learning, and facilitate teacher-student communication.

5. Personalized Learning: Educational technology supports personalized learning approaches by adapting instruction to individual student needs. Adaptive learning systems use data analytics and algorithms to provide tailored learning experiences, identifying students' strengths and weaknesses, and adjusting content and pace accordingly.

6. Online Assessments: Technology enables various forms of online assessments, including quizzes, tests, and simulations. Online assessment tools automate the grading process, provide immediate feedback to students, and generate data for teachers to monitor student performance and identify areas that require additional support.

7. Virtual and Augmented Reality: Virtual and augmented reality technologies offer immersive learning experiences by simulating real-world scenarios and environments. Students can explore historical sites, conduct virtual science experiments, or engage in virtual field trips. These technologies enhance student engagement and promote deeper understanding of complex subjects.

8. Data Analytics and Learning Analytics: Educational technology generates vast amounts of data that can be analyzed to gain insights into student learning and educational outcomes. Learning analytics tools help identify patterns, trends, and areas for improvement, allowing teachers and administrators to make data-driven decisions to enhance teaching and learning.

9. Gamification: Gamification elements in educational technology make learning more enjoyable and engaging. Game-based learning platforms and educational apps use game mechanics, challenges, and rewards to motivate students, reinforce learning, and develop critical thinking and problem-solving skills.

10. Blended Learning: Educational technology enables blended learning models, combining traditional face-to-face instruction with online components. Teachers can create flipped classrooms, where students access content online before class and engage in collaborative activities during face-to-face sessions. Blended learning provides flexibility, promotes self-paced learning, and caters to diverse student needs.

These applications of educational technology in formal education enhance accessibility, engagement, collaboration, and personalization, fostering a more student-centered and effective learning environment.

1.3.2 Educational Technology in Non-Formal Education system-

Educational technology also plays a significant role in non-formal education systems, which encompass a wide range of learning experiences outside of traditional formal education settings. Here are some key applications of educational technology in non-formal education:

1. Online Courses and Massive Open Online Courses (MOOCs): Educational technology platforms offer online courses and MOOCs that provide learners with access to high-quality educational content on various subjects. These courses often include interactive elements, such as video lectures, quizzes, and discussion forums, allowing learners to engage with the material and connect with fellow participants.

2. Skill Development and Vocational Training: Educational technology platforms provide opportunities for non-formal education in the form of skill development and vocational training. Online platforms offer courses and resources for learners to acquire practical skills in areas such as coding, graphic design, language learning, entrepreneurship, and more. These resources often include video tutorials, interactive exercises, and real-world projects.

3. Informal Learning Communities: Educational technology enables the formation and support of informal learning communities. Online forums, social media groups, and online learning platforms create spaces for individuals with shared interests to connect, share knowledge, and learn from each other. These communities foster peer-to-peer learning, collaboration, and the exchange of ideas and experiences.

4. Open Educational Resources (OER): Educational technology platforms facilitate the creation, sharing, and dissemination of open educational resources. OER are freely available resources such as textbooks, lecture notes, videos, and interactive modules. Non-formal learners can access these resources online, allowing them to engage in self-directed learning and pursue their areas of interest.

5. Digital Libraries and Archives: Educational technology platforms provide access to digital libraries and archives, offering a vast collection of educational resources, research papers, historical documents, and cultural artifacts. Learners can explore these resources to deepen their knowledge, conduct research, and access materials that may not be readily available in their local communities.

6. Online Tutoring and Mentoring: Educational technology enables online tutoring and mentoring programs, connecting learners with qualified instructors or mentors who provide personalized guidance and support. Through video conferencing, chat platforms, or virtual classrooms, learners can receive one-on-one or small group instruction, feedback, and mentorship.

7. Citizen Science and Crowdsourcing: Educational technology platforms support non-formal education initiatives such as citizen science and crowdsourcing projects. These initiatives engage learners in real-world scientific research, data collection, and problem-solving. Through online platforms, learners can contribute to scientific studies, analyze data, and collaborate with researchers and experts.

8. Digital Badges and Microcredentials: Educational technology platforms offer digital badges and micro credentials to recognize and validate non-formal learning achievements. Learners can earn badges or credentials by completing online courses, demonstrating specific skills, or participating in project-based learning activities. These digital credentials can be shared and displayed as evidence of acquired knowledge and competencies.

9. Mobile Learning: With the ubiquity of smart phones and mobile devices, educational technology extends non-formal learning beyond traditional settings. Mobile learning apps and platforms allow learners to access educational content on-the-go, enabling anytime, anywhere learning experiences.

10. Digital Literacy and ICT Skills: Educational technology in non-formal education promotes digital literacy and the development of information and communication technology (ICT) skills. Learners can acquire essential digital skills, such as internet research, online

communication, data analysis, and content creation, which are increasingly important in the digital age.

These applications of educational technology in non-formal education expand learning opportunities, promote lifelong learning, and empower individuals to pursue their interests, acquire new skills, and engage in self-directed learning outside of formal educational institutions.

1.3.3 Educational Technology in Informal Education system-

Mass Media Communication:

Mass media in education is of great help in spreading literacy, is useful in social education, provides significant education on all aspects of life as well as in a simplified way on complex matters such as performing operations, experiments etc. These media further help in modifying behaviour, attitudes and habits of individuals, have appeal to various senses and are thus useful in developing motivation. These also help in reinforcing group dynamics.

Radio:

Radio is a scientific device that functions as an effective auditory instrument for communication. It also plays an important role in education. It not only informs, but also inspires human beings to learn more and more. It not only includes values and virtues, but also creates attitudes, interests and appreciation of human life. It can cover a very wide area at the same time.

Vocational information about production and consumption practices in industry and agriculture, use of manures and hybrid seed, employment news are broadcast by Radio. Programmes regarding self-employment and talks by skilled people ensure better understanding among people for economic prosperity.

Apart from the above matters radio also inculcates scientific temper among people, helps to enjoy the cultural activities and eradicates social superstitions and age-old dogmas. The role of radio in shaping the society and providing information and education is significant. Educational broadcasting is also useful for improving education and for enrichment purposes.

Television:

Television has been given considerable importance in many countries as a source and a tool of teaching. The success stories of using television for education in many countries has negated the concept that television is basically an entertainment oriented medium and it is hostile to thoughts. Television is adaptable and can follow different approaches when used in different educational situations. The medium is used for formal, non-formal and informal education. To support formal education, television usually functions as a supportive and reinforcement tool. Television can be attached with school curriculum and time tables. When systematically organized it takes the form of a school broadcast. In non-formal education, television has a more specific role to play. When used as a part of multimedia communication tools, television can directly or indirectly teach the subject matter.

Importance of television to communicate information, ideas, skills and attitudes has been affirmed by researchers. You should attempt to study various reports published on educational television in different countries in different situations. In the words of the Director BBC “next to home and school I believe television to have a more profound influence on the human race than any other medium of communication.”

If media is to work as an effective teaching tool then certainly it is helping hand towards, achieving the aim and objectives of education. Media is an agent of boosting cultural economic and social development activity. Television, as an important mass medium disseminates education through formal and information methods.

Television also continues to benefit the masses by making them conscious of the environment, rights, duties and privilege. It is a source of teaching etiquette, language skills, hobbies, social relations and religious beliefs.

Role of television is neither fixed nor easily tangible and measurable. The role is directly related to the question of how the planners are serious and determined to use television. The role could either be enormous or, on the contrary, very meagre depending upon the specific tasks and available resources. Generally, television can help to achieve the following objectives:

- a) Social quality in education
- b) Enhance quality in education
- c) Reduce dependency on verbal teaching and teachers

d) Provide flexibility of time and space in learning.

e) Stimulates learning

f) Provide mass education opportunities.

As far as the impact of education television, it should rather be studied in more narrow and specific areas. In the world of scam; TV is more effective in teaching mathematics, science and social studies. Whereas history, humanities, and literature has not benefited from this medium to the same degree.

Film:

Although films have some other purpose to achieve, we can also learn something from them. Children learn many things from the films. People also listen to the message of the actors. Film can promote social welfare if they screen good stories and adopt techniques suiting the needs of society. Scientific and informative documentary films shown by other institutions are also very educative.

Press:

Press is an important passive agency for providing informal education. Newspapers, magazines, books, journals, and periodicals published and printed by a community have great influence in moulding opinions and shaping morals, attitudes, values, behaviours, character and personality of their readers. Happenings in social, economic, political, educational, sports, spiritual, cultural life, etc. at local, state, national and international levels are reported in the newspapers the next day. Journals, periodicals and papers give reports of surveys, findings of studies, articles, reviews of books by research reports, opinions of readers etc.

Little Media of Communication Pictures, posters, photographs, CCTV, sound motion pictures, educational films and documentaries, audio cassettes etc. come under this category. Little media also play the same role as big media but on a small scale as their viewership is limited. A few of these are described below:

Photographs, pictures and posters:

We generally find use of photographs and posters in villages and in modem homes, hospitals, dispensaries and other public places. It is essential that the pictures used actually convey what they intend to convey and should be aesthetically made. These should reflect the interest and

tastes of people. This medium is heavily used for population control campaigns, Sarva Shikshu Abhiyan for spreading primary education and for agricultural and health related issues.

Still pictures:

May take the form of slides, filmstrips, flip charts, charts, photographs or drawings printed in any form of booklet. Pictures are used in illustrating concepts on describing a thing as stimulating questions.

Internet Chat:

Internet chat is not chatting in the true sense of the word. It is in fact using Internet chat software by which typed messages are transmitted immediately between group members. Chee-Kit-Looi (2002) states that chat group members can remain anonymous and need not give their identity. Also a temporary history of the conversation can be recorded. b)

Internet Telephony:

With the advent of Internet telephony one need not carry bundles of data across the world. By this Internet telephony method a conversation much like the telephonic conversation takes place by using computer speakers and Internet in the former case and only telephone instrument in the latter case.

Video Conferencing:

Is a technique where the use of video cameras connected to two or more individuals' computers is made? Images and sounds are sent through the Internet. It is an interactive electronic communication among two or more locations. Live interaction between the source and the receiver takes place.

1.3.4 Educational Technology in Inclusive Education system

Assistive Devices:

Any adaptive device or service that increases participation, achievement or independence for a learner with a disability may be considered assistive technology (AT). Assistive technology helps learners who are differently able increase their access to the general curriculum and

improve their academic performance. It is important to thoughtfully consider what devices, tools and technologies will be appropriate to meet the learner's individual and unique learning needs. Assistive devices should not give learners an unfair advantage, but instead, should provide them the independence to compete effectively with peers in the school.

Tactile key-boarding instruction:

Tactile keyboarding instruction is the foundation of technological instruction. Typing without looking at the keys improves learners speed, accuracy and also minimizes the need for the learning to shift their gadget between the source, screen, and keyboard.

Braille code:

Braille code is a system of raised dots arranged in cells. The number and positions of the raised dots represents a particular letter, word, number, or symbol. For reading and writing of language arts the Braille that is used is known as literally Braille. Mostly in school two standardized grades, (grades I & II) are used in literary Braille.

Audio books:

Auditory books are a very effective tool for learners who are blind or visually impaired though they cannot replace instruction in reading, print and / or Braille. It is helpful in reading long passages. Pairing of books (Braille) with audio supported learning a fruitful strategy to build listening skills.

iPods as instructional tool:

This wonderful device can be used for accessing information, music, videos, books etc., for the learner with visual impairment.

Assistive Listening Device:

There is a wide range of assistive listening devices used in common life and various needs such as Alarm Clock, Telephone, Amplifiers, T.V. Ears, FM system, Doorbell aids, Bed Shakers, Relay Telephones, Captel Telephones.

iPhone Compatible hearing aids:

These hearing aids connect directly to the iPhone, iPad, or iPod, touch through the TruLink app. It streams mobile phone calls and music directly to the hearing aids with perfect sound and exceptional listening clarity.

Surf link Mobile 2:

Such hearing aids need to be used with new Surf link mobile 2. It performs the role of a cell phone transmitter, assistive listening device all in one. It can be used as an external microphone to listen to the television and conversations in noisy environments.

Arm Crutch:

Arm Crutch Set is a light weight crutch that helps to move anywhere those learners who have problems in their lower parts of body such as legs, knees etc. height may be adjusted with the help of metal pins.

Walker Bag:

This is comfortable for walking. It is attached with long velcro straps which can be easily cleaned.

Folding Walker:

Button Folding Walker ergonomically shaped released handles make this walker easy to open and closed. It has durable, light weight, anodised aluminium frame. The buffers at bottom reduced noise and strong floor grips.

Balance Board:

It is used in balance training, brain development and to improve coordination and stability. It is very effective for single or dual leg standing exercises.

Talking Clock:

It helps to know time by hearing.

TEXT-TO-SPEECH PROGRAMS:

Text-to-speech programs allow students with reading disabilities or physical disabilities to interact with their reading materials. As technology advances, many voice programs become more life-like and clearer, which allows for better comprehension of words and sentences.

Text-to-speech resources can also benefit students who are nonverbal because they help facilitate communication with teachers and other students. Many programs are technically free — they come preinstalled on modern computers and smartphones. However, more advanced software programs such as Zabaware, NaturalReader and iSpeech — to name only a few options — exist for educators to download and use in the classroom. These programs aim to allow students to hear text read aloud from devices such as tablets and computers, offer them an easier way to interact with written content, and ensure that the classroom is engaging, interactive and inclusive for students with disabilities.

CLOSED CAPTIONING:

Closed captions help students who are deaf or hard of hearing to interact with video and audio material. Subtitles and closed captions are different in that subtitles are often translated from another language, but the concept is largely similar. Most DVDs come with subtitles, but as education shifts to social media platforms, more websites will need to offer these necessary tools.

MOUSE-FREE NAVIGATION:

Computers with mouse-free navigation enable students with physical disabilities to complete digital assignments and participate in online courses. This technology most commonly includes voice-activated programs, joysticks and sip-and-puff devices. Joysticks provide smooth navigation in as few movements as possible, reducing the possibility of fatigue or strain. Many have symmetrical designs to prevent painful hand positioning, making this technology thoughtful and comfortable.

FM SYSTEMS:

Frequency modulated systems — or FM systems — allow students who are hard of hearing to listen to lectures while tuning out ambient noise. Children often use these because they're appropriate for managing loud environments without being overwhelmed. FM systems are small and portable, and they interact with hearing implants by amplifying the teacher's voice.

Computer Aided Learning:

The use of ICT in education has frequently involved computer aided learning (CAL) i.e. the provision of computing devices (desktops, laptops, iPads) with different types of software to support learning. Examples of CAL involving iPads and other tablets include by disabled students in an education support centre in Western Australia (Johnson, 2013), by learners with attention deficits in an inclusive classroom in Denmark (Andersen and Sorensen, 2015) and by students and staff in nine primary and secondary schools in the Metro Manila area in the Philippines (Lumagbas et al., 2019). The education support centre teachers received training in using a variety of popular applications to support literacy and mathematics. They considered that all the students responded positively to tablet use and that tablets were particularly suitable for autistic students, students with ADHD and those requiring multisensory (audio and visual) input. Other advantages included the extent to which they were customisable, portable and comprehensive. Issues were those typical of any new technology i.e. cost of the hardware and lack of teacher skills (Johnson, 2013).

Virtual Reality:

Virtual reality environments can help autistic students in stressful situations where they deal with crowds, such as hallways, school assemblies, and the cafeteria. By encountering these scenarios in a nonthreatening virtual environment, these students can gradually become accustomed to them and will be better prepared to respond calmly and appropriately in real-life situations. Virtual reality also gives students with motor disabilities the ability to manipulate objects that they are unable to manipulate in the real world.

Tablets/Handheld Touchscreen Computers:

These devices are useful for visual learning, reading, drawing, and watching videos. They can help students with motor impairments improve their coordination and those with reading

disabilities comprehend written information via text-to-speech apps. Further, students with autism respond very well to using these devices to learn. Numerous apps have been created specifically for autistic students.

NOVA Chat:

NOVA Chat is a dedicated speech generation device that, in conjunction with text-to-speech programs, provides assistance to students who have reading disabilities. It reads text aloud and also converts speech into text on the screen.

Read 180:

This software is designed for students who have reading disabilities. It enables users to customize a learning program for each individual student, giving those students fluency goals and tracking their progress as they continue to learn through the program.

DynaVox xPress:

Known as a handheld augmentative communication device, DynaVox xPress helps students develop greater reading fluency and natural speech patterns and pronunciation. The device uses a combination of text and images to express language to and increase the vocabulary of the user.

MangoMon:

This software offers interactive lessons in reading and math that provide students with individualized attention and tailored education plans. In addition, it gives the parents of the students the ability to view their child's learning progress.

LET US SUM UP:

When we discuss the use of technology in education, we often think about how useful things like TVs, overhead projectors, laptops, and other audio-visual tools, devices, and equipment are in the classroom. Technology is that aspect of growth that permeates practically every aspect of our culture and has an impact on how we work, play, and learn. As a result of global technical development and the creation of wireless and mobile devices, it is now crucial for the education sector to utilize this technology in the teaching-learning process.

Enhancing learning and raising educational standards are the two main goals of educational technology. Most importantly, technology should enhance the teaching and learning process and enable improved educational system performance.

The need to continue studying has been strongly understood during the epidemic since physical access to educational institutions was restricted out of concern for coronavirus infection. The non-formal system of education was already highly accustomed to using technology to manage teaching and learning even before the covid-19 pandemic. Technology is widely and successfully used in non-formal education. The use of technology in non-formal education has been covered in this unit.

When people study in an unstructured setting, which is what is meant by informal education. It is important for the growth of both problem-solving and experiential abilities. Even people can learn on their own without the aid of instructors or professors. In today's world, technology is crucial to learning in informal situations. the application of technology in informal education as covered in this unit.

The best method for addressing students who have strayed from the mainstreaming process is inclusive schooling, together with this informal learning environment. There are a lot of factors that can prevent someone from attending school or falling under the traditional educational system. An education that promotes inclusion in the mainstreaming process is known as inclusive education. The function of technology in this mainstreaming process is significant. In this unit, the use of technology in inclusive education has been covered.

ASSIGNMENT:

Short-Answer Type Question:

1. Give a suitable definition of Educational Technology.
2. How can films be used for educational purposes?
3. How do you use mobile devices in your learning?
4. What is the purpose of computer-aided learning?

Long-Answer Type Question:

1. What is the role of ICT in informal education?
2. What is the use of educational technology in inclusive education?
3. What is assistive technology for inclusive education?
4. How can educational technology be applied to informal systems of education?
5. How can educational technology be applied to the non-formal system of education?

6. What are the applications of educational technology in formal education?

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EDUCATIONAL TECHNOLOGY

Block-2

Psychological Theories and Educational Technology

CONTENT STRUCTURE:

Introduction

Learning Objectives

2.1 Overview of Behaviourist, Cognitive and Constructivist Theories and their implications to Instructional Design-

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2.1.2 Cognitivist theories

2.1.3 Constructivist theories

2.1.4 Skinner's theory and its implication in instructional design

2.1.5 Piaget's theory and its implication in instructional design

2.1.6 Ausubel's theory and its implication in instructional design

2.1.7 Bruner's theory and its implication in instructional design

2.1.8 Vygotsky's theory and its implication in instructional design

2.2 Relationship between learning theories and instructional strategies-

2.2.1 Behaviorism and instructional strategies

2.2.2 Cognitivism and instructional strategies

2.2.3 Constructivism and instructional strategies

2.2.4 Instructional strategies for large groups

2.2.5 Instructional strategies for small groups

2.2.6 Instructional strategies for formal groups

2.2.7 Instructional strategies for non-formal groups

Let us sum up

Assignment

Suggested Reading

INTRODUCTION:

There are several psychological theories related which strengthen the bases of educational technology including behaviorism, cognitivism, constructivism, humanism, and connectivism. This unit will elaborately discuss on various aspects of behaviourist, cognitive and constructivist theories and their implication in instructional design. Where behaviorism is only concerned with observable stimulus-response behaviors, as they can be studied in a systematic and observable manner, on the other hand cognitivists emphasise on both external factors (like information or data) and the internal thought process. Constructivists believe that the learner builds upon his or her previous experience and understanding to "construct" a new understanding. This unit also relate three approaches in the context of the implication in designing instructional strategies.

LEARNING OBJECTIVES:

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

- ❖ Describe behaviourist theories, cognitivist theories and constructivist theories
- ❖ Explain Skinner's theory and its implication in instructional design
- ❖ Explain Piaget's theory and its implication in instructional design
- ❖ Explain Ausubel's theory and its implication in instructional design
- ❖ Explain Bruner's theory and its implication in instructional design
- ❖ Explain Vygotsky's theory and its implication in instructional design
- ❖ Relate behaviourism, cognitivism and constructivism with its in instructional strategies
- ❖ Describe the instructional strategies for large and small groups, formal and non-formal groups

Block-2

Unit-1

Overview of Behaviourist, Cognitive and Constructivist Theories and their implications to Instructional Design

2.1.1 BEHAVIOURIST THEORIES:

The behaviourist school of thought maintains that behaviours can be described scientifically without recourse either to internal physiological events or to hypothetical constructs such as thoughts and beliefs, making behaviour a more productive area of focus for understanding human or animal psychology.

The main influences of behaviourist psychology were Ivan Pavlov (1849-1936), who investigated classical conditioning though often disagreeing with behaviourism or behaviourists; Edward Lee Thorndike (1874-1949), who introduced the concept of reinforcement and was the first to apply psychological principles to learning; John B. Watson (1878-1958), who rejected introspective methods and sought to restrict psychology to experimental methods; and B.F. Skinner (1904-1990), who conducted research on operant conditioning.

Burrhus Frederic Skinner called his brand of behaviourism radical behaviourism (1974). Radical behaviourism is the philosophy of the science of behaviour. It seeks to understand behaviour as a function of environmental histories of reinforcing consequences. This applied behaviourism does not accept private events such as thinking, perceptions, and unobservable emotions in a causal account of an organism's behaviour. The Skinner box led to the principle of reinforcement, which is the probability of something occurring based on the consequences of a behaviour.

While a researcher at Harvard, Skinner invented the operant conditioning chamber, popularly referred to as the Skinner box, used to measure responses of organisms (most often rats and pigeons) and their orderly interactions with the environment.

In contrast to classical conditioning, which involves involuntary responses (e.g., salivating), B.F. Skinner's Operant Conditioning, posited that learning occurs through the process of reinforcing an appropriate voluntary response to a stimulus in the environment.

Operant Conditioning has some very specific terminology. This terminology is often misused because the terms have a different meaning from their common colloquial use. Skinner claimed that the consequences that follow any given behavior could either increase or decrease that behavior. He used the term reinforcement to describe consequences that increase a behavior and punishment to describe those that decrease the behavior. He further claimed that a reinforcement or punishment could be either a stimulus added, which he defined as positive, or a stimulus removed, which he called negative. It is important to set aside the common meanings and connotations of the words positive and negative and focus on how they are defined in Operant Conditioning. In this context the terms are more like “adding and subtracting” rather than “good and bad.”

Behaviourism in Educational Technology:

Today, principles of Operant Conditioning are used by teachers for general classroom management and to support students with special needs. Educational technology has also employed Behaviorist principles, especially Operant Conditioning. Programmed Instruction (see https://en.wikipedia.org/wiki/Programmed_learning), for example, is a teaching strategy that developed and grew along with advances in technology. Drill and practice software is helpful for specific content, such as multiplication tables or second language vocabulary, that must be learned to a level of automaticity. Games and gamification also make use of Operant Conditioning principles. Acquiring resources and “leveling up” provide reinforcement, while losing one’s sword in a battle or falling off a cliff serve to punish errors.

Implication: Applying game incentives such as prompts, competition, badges, and rewards to ordinary activities, or gamification, is a growing approach to behaviour modification today. Health care has also applied some early innovative uses of gamification — from a Sony PS3 Move motion controller used to help children diagnosed with cancer to the launch of Games for Health, the first peer-reviewed journal dedicated to the research and design of health games and behavioural health strategies. Gamification is the process of taking an ordinary activity (like jogging or car sharing) and adding game mechanisms to it, including prompts, rewards, leader-boards, and competition between different players.

Focal points:

- Behaviourist psychology should concern itself with the observable behaviour of people and animals, not with unobservable events that take place in their minds.

- The main influences of behaviourist psychology were Ivan Pavlov (1849-1936), Edward Lee Thorndike (1874-1949), John B. Watson (1878-1958), and B.F. Skinner (1904-1990).
- The idea that we develop responses to certain stimuli that are not naturally occurring is called “classical conditioning.”
- Operant conditioning refers to how an organism operates on the environment or how it responds to what is presented to it in the environment.
- Reinforcement means to strengthen, and is used in psychology to refer to any stimulus that strengthens or increases the probability of a specific response.
- There are four types of reinforcement: positive, negative, punishment, and extinction.
- Behaviourist researchers used experimental methods (puzzle box, operant conditioning or Skinner box, Little Albert experiment) to investigate learning processes.
- Today, behaviourism is still prominent in applications such as gamification.

2.1.2 COGNITIVIST THEORIES:

In the 1960s, cognitive theories of learning gradually began to replace Behaviorism as a predominant view. Cognitive theorists claim that observable behaviors are not sufficient to describe learning because the internal thought processes are also part of learning. The cognitive perspective was heavily influenced by the development of computer technology and telecommunications, and uses the computer as a metaphor to understand what is happening in the human mind. Learning is defined as storing and organizing information and concepts in the mind.

Cognitive theories focus on how our mental processes or cognitions change over time. The theory of cognitive development is a comprehensive theory about the nature and development of human intelligence first developed by Jean Piaget. It is primarily known as a developmental stage theory, but in fact, it deals with the nature of knowledge itself and how humans come gradually to acquire it, construct it, and use it.

Jean Piaget (1896-1980) is one of the most influential cognitive theorists. Piaget believed that we are continuously trying to maintain cognitive equilibrium or a balance or cohesiveness in what we see and what we know. Children have much more of a challenge in maintaining this balance because they are constantly being confronted with new situations, new words, new objects, etc.

Information-processing approaches have become an important alternative to Piagetian approaches. Atkinson and Schiffrin's (1968) Information Processing Theory views the mind as a computer that accepts inputs and performs processing activities on those inputs, similar to the way a computer processes data rather than merely responding to stimuli. As a model, it assumes that even complex behavior such as learning, remembering, categorizing, and thinking can be broken down into a series of individual, specific steps, and as a person develops strategies for processing information, they can learn more complex information.

Lev Vygotsky was a Russian psychologist who argued that culture has a major impact on a child's cognitive development. He believed that the social interactions with adults and more interpersonal instruction, he believed children's minds would not advance very far as their knowledge would be based only on their own discoveries.

Some of the information processing approaches that build upon Piaget's research are known as neo-Piagetian theories. In contrast to Piaget's original work, which identified cognition as a single system of increasingly sophisticated general cognitive abilities, neo-Piagetian theories view cognition as a made up of different types of individual skills. Using the same terminology as information processing approaches, neo-Piagetian theories advance the idea that cognitive development proceeds quickly in certain areas and more slowly in others. Consider for example, our reading abilities and all the skills that are needed to recall stories. These abilities and skills may progress sooner than the abstract computational abilities used in algebra or trigonometry.

The scientific interface between cognitive neuroscience and human development has evoked considerable interest in recent years, as technological advances make it possible to map in detail the changes in brain structure that take place during development. These approaches look at cognitive development at the level of brain processes. Cognitive neuroscience is the scientific field that is concerned with the study of the biological processes and aspects that underlie cognition, with a specific focus on the neural connections in the brain which are involved in mental processes.

Cognitive Load Theory (Sweller, 1994) elaborates on the concept of a limited short term memory by defining three types of “load” that need to be considered by instructors and instructional designers. Extraneous load is the cognitive burden posed by distracting elements. According to Cognitive Load Theory, instructors and instructional designers should seek to minimize extraneous cognitive load to free the learner’s capacity to handle the intrinsic (complexity inherent in the subject matter) and germane load (cognitive demand of processing the subject matter).

Richard Mayer’s Cognitive Theory of Multimedia Learning is a particularly useful theory for educational technologists because it attempts to offer some prescriptive advice for designing media for learning.

Cognitivist approach in Educational Technology:

In terms of practice, this concept of mind as computer has led to several technology-based developments in teaching, including:

Intelligent tutoring systems, a more refined version of teaching machines, based on breaking down learning into a series of manageable steps, and analysing learners’ responses to direct them to the most appropriate next step. Adaptive learning is the latest extension of such developments;

Artificial intelligence, which seeks to represent in computer software the mental processes used in human learning (which of course if successful would result in computers replacing many human activities – such as teaching, if learning is considered in an objectivist framework);

Pre-determined learning outcomes, based on an analysis and development of different kinds of cognitive activities, such as comprehension, analysis, synthesis, and evaluation;

Problem-based learning, based on an analysis of the thinking processes successful problem-solvers use to solve problems;

Instructional design approaches that attempt to manage the design of teaching to ensure successful achievement of pre-determined learning outcomes or objectives.

Focal points:

- Cognitive school emphasizes on mental processes or cognitions change over time.
- The brain uses schemas (mental frameworks) as building blocks toward knowledge.
- Jean Piaget (1896-1980), Jerome S. Bruner, Abraham Maslow (1908-1970), Carl Rogers (1902-1987) influenced cognitive psychology.
- Information Processing Theory views the mind as a computer.
- Cognitive neuroscience focuses on the neural connections in the brain which are involved in mental processes.
- Instructors and instructional designers should seek to minimize extraneous cognitive load.

2.1.3 CONSTRUCTIVIST THEORIES:

Constructivism is a theory in education which posits that individuals or learners do not acquire knowledge and understanding by passively perceiving it within a direct process of knowledge transmission, rather they construct new understandings and knowledge through experience and social discourse, integrating new information with what they already know.

Constructivists emphasise the importance of consciousness, free will and social influences on learning. Constructivists believe that knowledge is essentially subjective in nature, constructed from our perceptions and mutually agreed upon conventions. According to this view, we construct new knowledge rather than simply acquire it via memorization or through transmission from those who know to those who don't know. Constructivists believe that meaning or understanding is achieved by assimilating information, relating it to our existing knowledge, and cognitively processing it (in other words, thinking or reflecting on new information). Social constructivists believe that this process works best through discussion and social interaction, allowing us to test and challenge our own understandings with those of others. Constructivists believe that learning is a constantly dynamic process. Understanding of concepts or principles develops and becomes deeper over time.

Constructivism can be traced back to educational psychology in the work of Jean Piaget (1896–1980) identified with Piaget's theory of cognitive development. Lev Vygotsky's (1896–1934) theory of social constructivism emphasized the importance of sociocultural learning; how interactions with adults, more capable peers, and cognitive tools are internalized by learners to form mental constructs through the zone of proximal development. Expanding upon Vygotsky's theory Jerome Bruner and other educational psychologists developed the important concept of instructional scaffolding, whereby the social or informational environment offers supports (or scaffolds) for learning that are gradually withdrawn as they become internalized. Writers who influenced constructivism include John Dewey (1859–1952), Maria Montessori (1870–1952), Władysław Strzemiński (1893–1952), Jean Piaget (1896–1980), Lev Vygotsky (1896–1934), Heinz von Foerster (1911–2002), George Kelly (1905–1967), Jerome Bruner (1915–2016), Herbert Simon (1916–2001), Paul Watzlawick (1921–2007), Ernst von Glasersfeld (1917–2010), Edgar Morin (born 1921), Humberto Maturana (1928–2021), Paulo Freire (1921–1997).

Social constructivism thus emphasizes the importance of the student being actively involved in the learning process, unlike previous educational viewpoints where the responsibility rested with the instructor to teach and where the learner played a passive, receptive role. Von Glasersfeld (1989) emphasized that learners construct their own understanding and that they do not simply mirror and reflect what they read.

Instructors have to adapt to the role of facilitators and not teachers. Whereas a teacher gives a didactic lecture that covers the subject matter, a facilitator helps the student to get to his or her own understanding of the content. In the former scenario the learner plays a passive role and in the latter scenario the student plays an active role in the learning process. The emphasis thus turns away from the instructor and the content, and towards the student.

Social constructivism, strongly influenced by Vygotsky's (1978) work, suggests that knowledge is first constructed in a social context and is then appropriated by individuals. According to social constructivists, the process of sharing individual perspectives — called collaborative elaboration — results in learners constructing understanding together that wouldn't be possible alone. Vygotsky (1978) also highlighted the convergence of the social and practical elements in learning by saying that the most significant moment in the course of intellectual development occurs when speech and practical activity, two previously completely independent lines of development, converge. Through practical activity a child

constructs meaning on an intra-personal level, while speech connects this meaning with the interpersonal world shared by the child and her/his culture.

Constructivist approach in Educational Technology:

Constructivists also approach technology for teaching differently from behaviourists. From a constructivist perspective, brains have more plasticity, adaptability and complexity than current computer software programs. Other uniquely human factors, such as emotion, motivation, free will, values, and a wider range of senses, make human learning very different from the way computers operate. Following this reasoning, education would be much better served if computer scientists tried to make software to support learning more reflective of the way human learning operates, rather than trying to fit human learning into the current restrictions of behaviourist computer programming.

Focal points:

- Learners construct new understandings and knowledge through experience and social discourse.
- Lev Vygotsky's (1896-1934) theory of social constructivism emphasized the importance of sociocultural learning.
- Learning is an active process. Knowledge is first constructed in a social context and is then appropriated by individuals.
- Learners with different skills and backgrounds should collaborate in tasks and discussions to arrive at a shared understanding of the truth in a specific field.

2.1.4 SKINNER'S THEORY AND ITS IMPLICATION IN INSTRUCTIONAL DESIGN:

Burrhus Frederic Skinner (1904 –1990) was an American psychologist, behaviorist, author, inventor, and social philosopher. Skinner's ideas about behaviorism were largely set forth in his first book, *The Behavior of Organisms* (1938). He gives a systematic description of the

manner in which environmental variables control behavior. He distinguished two sorts of behavior which are controlled in different ways:

Respondent behaviors are elicited by stimuli, and may be modified through respondent conditioning, often called classical (or pavlovian) conditioning, in which a neutral stimulus is paired with an eliciting stimulus. Such behaviors may be measured by their latency or strength.

Operant behaviors are 'emitted', meaning that initially they are not induced by any particular stimulus. They are strengthened through operant conditioning (aka instrumental conditioning), in which the occurrence of a response yields a reinforcer. Such behaviors may be measured by their rate.

Reinforcement, a key concept of behaviorism, is the primary process that shapes and controls behavior, and occurs in two ways: positive and negative. Both types of reinforcement strengthen behavior, or increase the probability of a behavior reoccurring; the difference being in whether the reinforcing event is something applied (positive reinforcement) or something removed or avoided (negative reinforcement). Punishment can be the application of an aversive stimulus/event (positive punishment or punishment by contingent stimulation) or the removal of a desirable stimulus (negative punishment or punishment by contingent withdrawal).

Positive/Negative	Reinforcement	Punishment
Positive	Something is added to increase the likelihood of a behavior.	Something is added to decrease the likelihood of a behavior.
Negative	Something is removed to increase the likelihood of a behavior.	Something is removed to decrease the likelihood of a behavior.

Skinner recognized that behavior is typically reinforced more than once, and, together with Charles Ferster, he did an extensive analysis of the various ways in which reinforcements could be arranged over time, calling it the schedules of reinforcement. The most notable schedules of reinforcement studied by Skinner were continuous, interval (fixed or variable), and ratio (fixed or variable).

- **Continuous reinforcement (CRF):** Each time a specific action is performed the subject receives a reinforcement. This method is effective when teaching a new behavior because it quickly establishes an association between the target behavior and the reinforcer.
- **Interval schedule:** based on the time intervals between reinforcements.
 - **Fixed interval schedule (FI):** A procedure in which reinforcements are presented at fixed time periods, provided that the appropriate response is made. This schedule yields a response rate that is low just after reinforcement and becomes rapid just before the next reinforcement is scheduled.
 - **Variable interval schedule (VI):** A procedure in which behavior is reinforced after scheduled but unpredictable time durations following the previous reinforcement. This schedule yields the most stable rate of responding, with the average frequency of reinforcement determining the frequency of response.
- **Ratio schedules:** based on the ratio of responses to reinforcements.
 - **Fixed ratio schedule (FR):** A procedure in which reinforcement is delivered after a specific number of responses have been made.
 - **Variable ratio schedule (VR):** A procedure in which reinforcement comes after a number of responses that is randomized from one reinforcement to the next (e.g. slot machines). The lower the number of responses required, the higher the response rate tends to be. Variable ratio schedules tend to produce very rapid and steady responding rates in contrast with fixed ratio schedules where the frequency of response usually drops after the reinforcement occurs.

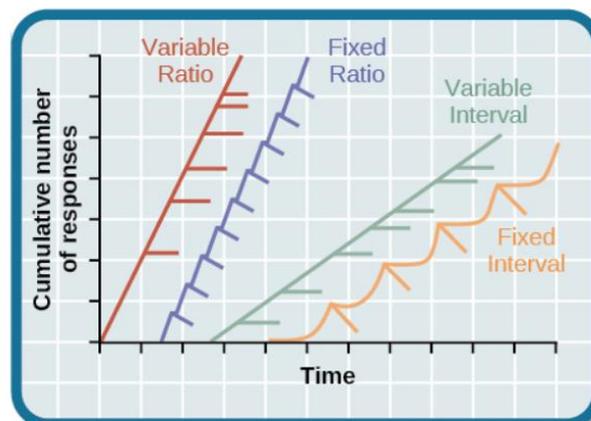


Figure - Reinforcement schedules (adapted from <https://pressbooks-dev.oer.hawaii.edu/psychology/chapter/operant-conditioning/>)

In his operant conditioning experiments, Skinner often used an approach called shaping. Instead of rewarding only the target behavior, in shaping, we reward successive approximations of a target behavior. Why is shaping needed? Remember that in order for reinforcement to work, the organism must first display the behavior. Shaping is needed because it is extremely unlikely that an organism will display anything but the simplest of behaviors spontaneously. In shaping, behaviors are broken down into many small, achievable steps.

Skinner showed that pigeons could be trained in quite complex behaviour by rewarding particular, desired responses that might initially occur at random, with appropriate stimuli, such as the provision of food pellets. He also found that a chain of responses could be developed, without the need for intervening stimuli to be present, thus linking an initially remote stimulus with a more complex behaviour. Furthermore, inappropriate or previously learned behaviour could be extinguished by withdrawing reinforcement. Reinforcement in humans can be quite simple, such as immediate feedback for an activity or getting a correct answer to a multiple-choice test.

Skinner's theory of learning provides the underlying theoretical basis for the development of teaching machines, measurable learning objectives, computer-assisted instruction, and multiple choice tests. Behaviourism's influence is still strong in corporate and military training, and in some areas of science, engineering, and medical training. It can be of particular value for rote learning of facts or standard procedures such as multiplication tables, for dealing with children or adults with limited cognitive ability due to brain disorders, or for compliance with industrial or business standards or processes that are invariant and do not require individual judgement.

Skinner advocated for immediate praise, feedback, and/or reward when seeking to change troublesome or encourage correct behavior in the classroom. Teachers seeking to implement a reinforcement system in their classroom should use strategies such as a "token economy" to reward students immediately for behaviors that they are reinforcing. Skinner also advocated for teacher identification of and reflection on the environmental effects on student behavior. Formalized strategies that focus on the identification of "triggers" of student behavior are influenced by Skinner's work.

2.1.5 PIAGET'S THEORY AND ITS IMPLICATION IN INSTRUCTIONAL DESIGN:

Jean William Fritz Piaget (1896–1980) is a stage theorist who studied childhood development. Piaget focused on children's cognitive growth. He believed that thinking is a central aspect of development and that children are naturally inquisitive. His theory of cognitive development holds that our cognitive abilities develop through specific stages, which exemplifies the discontinuity approach to development.

Piaget said that children develop schemata to help them understand the world. Schemata are concepts (mental models) that are used to help us categorize and interpret information. By the time children have reached adulthood, they have created schemata for almost everything. When children learn new information, they adjust their schemata through two processes: assimilation and accommodation.

- **Assimilation:** First, they assimilate new information or experiences in terms of their current schemata: assimilation is when they take in information that is comparable to what they already know.
- **Accommodation:** It describes when they change their schemata based on new information. This process continues as children interact with their environment.

Piaget thought development unfolds in a series of stages approximately associated with age ranges. He proposed a theory of cognitive development that unfolds in four stages:

I. Sensorimotor stage (0 - 2 years): The children experience the world through movement and their senses. During the sensorimotor stage children are extremely egocentric, meaning they cannot perceive the world from others' viewpoints. The sensorimotor stage is divided into six sub stages:

- **Simple reflexes (0 – 1 month):**

At this time infants use reflexes such as rooting and sucking.

- **First habits and primary circular reactions (1 - 4 months)**

During this time infants learn to coordinate sensation and two types of schema (habit and circular reactions). A primary circular reaction is when the infant tries to reproduce an event that happened by accident (ex.: sucking thumb).

- **Secondary circular reactions (4 – 8 months)**

At this time they become aware of things beyond their own body; they are more object-oriented. At this time they might accidentally shake a rattle and continue to do it for sake of satisfaction.

- **Coordination of secondary circular reactions (8 – 12 months)**

During this stage they can do things intentionally. They can now combine and recombine schemata and try to reach a goal (ex.: use a stick to reach something). They also begin to understand object permanence in the later months and early into the next stage. That is, they understand that objects continue to exist even when they can't see them.

- **Tertiary circular reactions, novelty, and curiosity (12 – 18 months):**

During this stage infants explore new possibilities of objects; they try different things to get different results.

- **Internalization of schemata (18 - 24 months)**

II. Preoperational stage (2 – 7 years):

During the preoperational stage of cognitive development, Piaget noted that children do not yet understand concrete logic and cannot mentally manipulate information. Children's increase in playing and pretending takes place in this stage. However, the child still has trouble seeing things from different points of view. The children's play is mainly categorized by symbolic play and manipulating symbols. The preoperational stage is sparse and logically inadequate in regard to mental operations. The child is able to form stable concepts as well as magical beliefs. Children in this stage cannot perform mental operations because they have not developed an understanding of conservation, which is the idea that even if you change the appearance of something, it is still equal in size as long as nothing has been removed or added. During this stage, we also expect children to display egocentrism, which means that the child is not able to take the perspective of others. The Preoperational Stage is divided into two sub-stages:

- **Symbolic Function Sub-stage (2-4 years):**

Children find themselves using symbols to represent physical models of the world around them. This is demonstrated through a child's drawing of their family in which

people are not drawn to scale or accurate physical traits are given. The child knows they are not accurate but it does not seem to be an issue to them.

- **Intuitive Thought Sub-stage (4 – 7 years)**

Children tend to become very curious and ask many questions, beginning the use of primitive reasoning. There is an emergence in the interest of reasoning and wanting to know why things are the way they are. Piaget called it the "intuitive substage" because children realize they have a vast amount of knowledge, but they are unaware of how they acquired it. Centration, conservation, irreversibility, class inclusion, and transitive inference are all characteristics of preoperative thought.

III. Concrete operational stage (7 – 11 years):

Children can now converse and think logically (they understand reversibility) but are limited to what they can physically manipulate. They are no longer egocentric. During this stage, children become more aware of logic and conservation, topics previously foreign to them. Children also improve drastically with their classification skills. Children in the concrete operational stage also understand the principle of reversibility, which means that objects can be changed and then returned back to their original form or condition.

IV. Formal operational stage (11 to 16 years and onwards):

Children develop abstract thought and can easily conserve and think logically in their mind. Abstract thought is newly present during this stage of development. Children are now able to think abstractly and use metacognition. Along with this, the children in the formal operational stage display more skills oriented towards problem solving, often in multiple steps.

Teachers can also use Piaget's theory to help their students. For example, recent studies have shown that children in the same grade and of the same age perform differently on tasks measuring basic addition and subtraction accuracy. Children in the preoperational and concrete operational levels of cognitive development perform arithmetic operations (such as addition and subtraction) with similar accuracy; however, children in the concrete operational level have been able to perform both addition problems and subtraction problems with overall greater precision. Teachers can use Piaget's theory to see where each child in their class stands with each subject by discussing the syllabus with their students and the students' parents.

2.1.6 AUSUBEL'S THEORY AND ITS IMPLICATION IN INSTRUCTIONAL DESIGN:

David Paul Ausubel (1918 – 2008) was an American psychologist. His most significant contribution to the fields of educational psychology, cognitive science, and science education learning was on the development and research on "advance organizers". Ausubel believed that an understanding of concepts, principles, and ideas is achieved through deductive reasoning. He believed in the idea of meaningful learning as opposed to rote memorization.

An advance organizer is information presented by an instructor that helps the student organize new incoming information. This is achieved by directing attention to what is important in the coming material, highlighting relationships, and providing a reminder about relevant prior knowledge. Advance organizers make it easier to learn new material of a complex or otherwise difficult nature. Ausubel distinguishes between two kinds of advance organizer: comparative and expository.

- **Comparative Organizers** - The main goal of comparative organizers is to activate existing schemas. Similarly, they act as reminders to bring into the working memory of what one may not realize are relevant. By acting as reminders, the organizer points out explicitly "whether already established anchoring ideas are non-specifically or specifically relevant to the learning material". Similarly, a comparative organizer is used both to integrate as well as discriminate. It "integrate[s] new ideas with basically similar concepts in cognitive structure, as well as increase[s] discriminability between new and existing ideas which are essentially different but confusably similar". An example of a comparative organizer would be one used for a history lesson on revolutions. This organizer "might be a statement that contrasts military uprisings with the physical and social changes involved in the Industrial Revolution".
- **Expository Organizers** - In contrast, expository organizers provide new knowledge that students will need to understand the upcoming information. Expository organizers are often used when the new learning material is unfamiliar to the learner. They often relate what the learner already knows with the new and unfamiliar material—this in turn is aimed to make the unfamiliar material more plausible to the learner.

An example which Ausubel and Floyd G. Robinson provide in their book 'School Learning: An Introduction to Educational Psychology' is the concept of the Darwinian theory of evolution. To make the Darwinian theory of evolution more plausible, an expository organizer would have a combination of relatedness to general relevant knowledge that is already present, as well as relevance for the more detailed Darwinian Theory.

The concept of meaningful learning in context of Ausubel's theory has a few important implications for the instructional process:

- A successful instructional process is dependent both on learner and teacher. Ausubel referred to the process of teaching as expository teaching (teacher centered approach, the teacher presents the concepts and ideas a student should learn) and to learning as reception learning (the teacher "places" new ideas in context of learners cognitive structure), yet he notices that learning won't occur unless the student makes an active attempt to relate new material to the already acquired knowledge.
- Prior knowledge is the key to what will be learned next. In order to fulfill meaningful learning requirements learner has to have crucial higher level concepts (prior knowledge) that will serve as anchoring sites (subsumers) for new knowledge or he has to be provided with appropriate organizers.
- After assuring student has required prior knowledge, the teacher has to present learning material in an organized and structured manner (starting from more general concepts and then going to more details), cross reference old and new ideas using different teaching aids or charts, continue with sufficient amount of practice in form of applications of learned material in order to facilitate its assimilation.

2.1.7 BRUNER'S THEORY AND ITS IMPLICATION IN INSTRUCTIONAL DESIGN:

Jerome Seymour Bruner (1915 – 2016) turned his attention to the subject of developmental psychology and studied the way children learn. He coined the term "scaffolding" to describe an instructional process in which the instructor provides carefully programmed guidance, reducing the amount of assistance as the student progresses through task learning. Bruner suggested that students may experience, or "represent" tasks in three ways: enactive representation (action-based), iconic representation (image-based), and symbolic

representation (language-based). Rather than neatly delineated stages, the modes of representation are integrated and only loosely sequential as they "translate" into each other. Symbolic representation remains the ultimate mode, and it "is clearly the most mysterious of the three."

Bruner's learning theory suggests that it is efficacious, when faced with new material, to follow a progression from enactive to iconic to symbolic representation; this holds true even for adult learners. A true instructional designer, Bruner's work also suggests that a learner (even of a very young age) is capable of learning any material so long as the instruction is organized appropriately, in sharp contrast to the beliefs of Piaget and other stage theorists. Like Bloom's Taxonomy, Bruner suggests a system of coding in which people form a hierarchical arrangement of related categories. Each successively higher level of categories becomes more specific, echoing Benjamin Bloom's understanding of knowledge acquisition as well as the related idea of instructional scaffolding.

In accordance with this understanding of learning, Bruner proposed the spiral curriculum, a teaching approach in which each subject or skill area is revisited at intervals, at a more sophisticated level each time. First there is basic knowledge of a subject, then more sophistication is added, reinforcing principles that were first discussed. Bruner also believes learning should be spurred by interest in the material rather than tests or punishment, since one learns best when one finds the acquired knowledge appealing.

A major theme in the theoretical framework of Bruner is that learning is an active process in which learners construct new ideas or concepts based upon their current/past knowledge. The learner selects and transforms information, constructs hypotheses, and makes decisions, relying on a cognitive structure to do so. Cognitive structure (i.e., schema, mental models) provides meaning and organization to experiences and allows the individual to "go beyond the information given".

As far as instruction is concerned, the instructor should try and encourage students to discover principles by themselves. The instructor and student should engage in an active dialogue (i.e., Socratic learning). The task of the instructor is to translate information to be learned into a format appropriate to the learner's current state of understanding. Curriculum should be organized in a spiral manner so that the student continually builds upon what they have already learned.

Bruner (1966) states that a theory of instruction should address four major aspects:

- Predisposition towards learning
- The ways in which a body of knowledge can be structured so that it can be most readily grasped by the learner
- The most effective sequences in which to present material
- The nature and pacing of rewards and punishments. Good methods for structuring knowledge should result in simplifying, generating new propositions, and increasing the manipulation of information.

Bruner's constructivist theory is a general framework for instruction based upon the study of cognition. The principles of Bruner's theory were –

- Instruction must be concerned with the experiences and contexts that make the student willing and able to learn (readiness).
- Instruction must be structured so that it can be easily grasped by the student (spiral organization).
- Instruction should be designed to facilitate extrapolation and or fill in the gaps (going beyond the information given).

2.1.8 VYGOTSKY'S THEORY AND ITS IMPLICATION IN INSTRUCTIONAL DESIGN:

Lev Semyonovich Vygotsky (1896 –1934) argued that culture has a major impact on a child's cognitive development. Piaget and Gesell believed development stemmed directly from the child, and although Vygotsky acknowledged intrinsic development, he argued that it is the language, writings, and concepts arising from the culture that elicit the highest level of cognitive thinking. He believed that the social interactions with adults and more learned peers can facilitate a child's potential for learning. Without this interpersonal instruction, he believed children's minds would not advance very far as their knowledge would be based only on their own discoveries.

Vygotsky's best known concept is the Zone of Proximal Development (ZPD). Vygotsky stated that children should be taught in the ZPD, which occurs when they can almost perform a task, but not quite on their own without assistance. With the right kind of teaching, however, they can accomplish it successfully. A good teacher identifies a child's ZPD and

helps the child stretch beyond it. Then the adult (teacher) gradually withdraws support until the child can then perform the task unaided. Researchers have applied the metaphor of scaffolds to this way of teaching. Scaffolding is the temporary support that parents or teachers give a child to do a task.

According to Vygotsky, through the assistance of a more knowledgeable other, a child is able to learn skills or aspects of a skill that go beyond the child's actual developmental or maturational level. The lower limit of ZPD is the level of skill reached by the child working independently (also referred to as the child's developmental level). The upper limit is the level of potential skill that the child is able to reach with the assistance of a more capable instructor. In this sense, the ZPD provides a prospective view of cognitive development, as opposed to a retrospective view that characterizes development in terms of a child's independent capabilities. The advancement through and attainment of the upper limit of the ZPD is limited by the instructional and scaffolding-related capabilities of the more knowledgeable other (MKO). The MKO is typically assumed to be an older, more experienced teacher or parent, but often can be a learner's peer or someone their junior. The MKO need not even be a person, it can be a machine or book, or other source of visual and/or audio input.

Vygotsky's theory has important implications in online and distance learning also. Collaboration can be done using tools, including software like wikis. What makes wiki a great asynchronous e-learning environment is the fact that it offers a quick way for learners to collaborate and share ideas textually while creating a content-rich website. In virtual communities like wikis, members (experts and novices) are able to share their expertise and learn through scaffolding, much like Vygotsky's concept of knowledge acquisition. Online discussion tools are used to extend discussions beyond the traditional classroom setting. They are sometimes relied on heavily as a tool in distance learning to build an online learning community. Scaffolding strategies that promote interactions refer to strategies intended to promote learner-instructor and learner-learner interactions in contexts such as online discussions, individual learning, and group collaboration. In order to scaffold learning in student discussions and foster constructive learning, the instructor should take on more of a facilitator role and be seen as a "guide on the side" rather than a "sage on the stage". The instructor should stress the importance of participation and provide basic guidelines in regards to how students should post and reply to others—this will promote learner-learner interactions.

Block-2

Unit-2

Relationship between Learning Theories and Instructional Strategies

2.2.1 BEHAVIORISM AND INSTRUCTIONAL STRATEGIES:

Behaviorism equates learning with changes in either the form or frequency of observable performance. Learning is accomplished when a proper response is demonstrated following the presentation of a specific environmental stimulus. For example, when presented with a math flashcard showing the equation “ $2 + 4 = ?$ ” the learner replies with the answer of “6.” The equation is the stimulus and the proper answer is the associated response. The key elements are the stimulus, the response, and the association between the two. Of primary concern is how the association between the stimulus and response is made, strengthened, and maintained.

Although both learner and environmental factors are considered important by behaviorists, environmental conditions receive the greatest emphasis. Behaviorists assess the learners to determine at what point to begin instruction as well as to determine which reinforcers are most effective for a particular student. The most critical factor, however, is the arrangement of stimuli and consequences within the environment.

Memory, as commonly defined by the layman, is not typically addressed by behaviorists. Although the acquisition of “habits” is discussed, little attention is given as to how these habits are stored or recalled for future use.

In behavioral learning theories, transfer is a result of generalization. Situations involving identical or similar features allow behaviors to transfer across common elements. For example, the student who has learned to recognize and classify elm trees demonstrates transfer when (s) he classifies maple trees using the same process. The similarities between the elm and maple trees allow the learner to apply the previous elm tree classification learning experience to the maple tree classification task.

Behaviorists attempt to prescribe strategies that are most useful for building and strengthening stimulus-response associations, including the use of instructional cues, practice, and reinforcement. These prescriptions have generally been proven reliable and effective in facilitating learning that involves discriminations (recalling facts), generalizations (defining

and illustrating concepts), associations (applying explanations), and chaining (automatically performing a specified procedure). However, it is generally agreed that behavioral principles cannot adequately explain the acquisition of higher level skills or those that require a greater depth of processing (e.g., language development, problem solving, inference generating, critical thinking)

Specific assumptions or principles that have direct relevance to instructional design include the following -

- An emphasis on producing observable and measurable outcomes in students [behavioral objectives, task analysis, criterion-referenced assessment]
- Pre-assessment of students to determine where instruction should begin [learner analysis]
- Emphasis on mastering early steps before progressing to more complex levels of performance [sequencing of instructional presentation, mastery learning]
- Use of reinforcement to impact performance [tangible rewards, informative feedback]
- Use of cues, shaping and practice to ensure a strong stimulus-response association [simple to complex sequencing of practice, use of prompts]

The goal of instruction for the behaviorist is to elicit the desired response from the learner who is presented with a target stimulus. To accomplish this, the learner must know how to execute the proper response, as well as the conditions under which that response should be made. Therefore, instruction is structured around the presentation of the target stimulus and the provision of opportunities for the learner to practice making the proper response. To facilitate the linking of stimulus-response pairs, instruction frequently uses cues (to initially prompt the delivery of the response) and reinforcement (to strengthen correct responding in the presence of the target stimulus).

Behavioral theories imply that the job of the teacher/designer is to –

- determine which cues can elicit the desired responses
- arrange practice situations in which prompts are paired with the target stimuli that initially have no eliciting power but which will be expected to elicit the responses in the “natural” (performance) setting

- arrange environmental conditions so that students can make the correct responses in the presence of those target stimuli and receive reinforcement for those responses.

2.2.2 Cognitivism and instructional strategies:

Cognitive theories stress the acquisition of knowledge and internal mental structures and, as such, are closer to the rationalist end of the epistemology continuum. Learning is equated with discrete changes between states of knowledge rather than with changes in the probability of response. Cognitive theories focus on the conceptualization of students' learning processes and address the issues of how information is received, organized, stored, and retrieved by the mind.

Cognitivism, like behaviorism, emphasizes the role that environmental conditions play in facilitating learning. Instructional explanations, demonstrations, illustrative examples and matched non-examples are all considered to be instrumental in guiding student learning. Similarly, emphasis is placed on the role of practice with corrective feedback. The cognitive approach focuses on the mental activities of the learner that lead up to a response and acknowledges the processes of mental planning, goal-setting, and organizational strategies. Cognitive theories contend that environmental "cues" and instructional components alone cannot account for all the learning that results from an instructional situation. Additional key elements include the way that learners attend to, code, transform, rehearse, store and retrieve information.

Learning results when information is stored in memory in an organized, meaningful manner. Teachers/designers are responsible for assisting learners in organizing that information in some optimal way. Designers use techniques such as advance organizers, analogies, hierarchical relationships, and matrices to help learners relate new information to prior knowledge. Forgetting is the inability to retrieve information from memory because of interference, memory loss, or missing or inadequate cues needed to access information.

According to cognitive theories, transfer is a function of how information is stored in memory. When a learner understands how to apply knowledge in different contexts, then transfer has occurred. Understanding is seen as being composed of a knowledge base in the form of rules, concepts, and discriminations. Prior knowledge is used to establish boundary constraints for identifying the similarities and differences of novel information.

Because of the emphasis on mental structures, cognitive theories are usually considered more appropriate for explaining complex forms of learning (reasoning, problem-solving, information-processing) than are those of a more behavioral perspective.

Specific assumptions or principles that have direct relevance to instructional design include the following –

- Emphasis on the active involvement of the learner in the learning process [learner control, metacognitive training (e.g., self-planning, monitoring, and revising techniques)]
- Use of hierarchical analyses to identify and illustrate prerequisite relationships [cognitive task analysis procedures]
- Emphasis on structuring, organizing, and sequencing information to facilitate optimal processing [use of cognitive strategies such as outlining, summaries, synthesizers, advance organizers, etc.]
- Creation of learning environments that allow and encourage students to make connections with previously learned material [recall of prerequisite skills; use of relevant examples, analogies]

2.2.3 Constructivism and instructional strategies:

Constructivism is a theory that equates learning with creating meaning from experience. Constructivists do not share with cognitivists and behaviorists the belief that knowledge is mind-independent and can be “mapped” onto a learner. Constructivists do not deny the existence of the real world but contend that what we know of the world stems from our own interpretations of our experiences. Humans create meaning as opposed to acquiring it. Learners do not transfer knowledge from the external world into their memories; rather they build personal interpretations of the world based on individual experiences and interactions.

Both learner and environmental factors are critical to the constructivist, as it is the specific interaction between these two variables that creates knowledge. Constructivists argue that behavior is situationally determined.

The goal of instruction is not to ensure that individuals know particular facts but rather that they elaborate on and interpret information. A concept will continue to evolve with each new use as new situations, negotiations, and activities recast it in a different, more densely textured form. Therefore, “memory” is always under construction as a cumulative history of interactions. The focus of constructivism is on creating cognitive tools which reflect the wisdom of the culture in which they are used as well as the insights and experiences of individuals. There is no need for the mere acquisition of fixed, abstract, self-contained concepts or details. To be successful, meaningful, and lasting, learning must include all three of these crucial factors: activity (practice), concept (knowledge), and culture (context).

The constructivist position assumes that transfer can be facilitated by involvement in authentic tasks anchored in meaningful contexts. Appropriate and effective use comes from engaging the learner in the actual use of the tools in real-world situations. Thus, the ultimate measure of learning is based on how effective the learner’s knowledge structure is in facilitating thinking and performing in the system in which those tools are used.

The constructivist designer specifies instructional methods and strategies that will assist learners in actively exploring complex topics/environments and that will move them into thinking in a given content area as an expert user of that domain might think. Knowledge is not abstract but is linked to the context under study and to the experiences that the participants bring to the context. Some of the specific strategies utilized by constructivists include situating tasks in real-world contexts, use of cognitive apprenticeships (modeling and coaching a student toward expert performance), presentation of multiple perspectives (collaborative learning to develop and share alternative views), social negotiation (debate, discussion, evidence giving), use of examples as real “slices of life,” reflective awareness, and providing considerable guidance on the use of constructive processes. Inquiry-based learning (IBL), Problem-based learning (PBL), Cooperative learning etc. are the examples of instructional strategies which are influenced by constructivism.

The following are several specific assumptions or principles from the constructivist position that have direct relevance for the instructional designer –

- An emphasis on the identification of the context in which the skills will be learned and subsequently applied [anchoring learning in meaningful contexts].
- An emphasis on learner control and the capability of the learner to manipulate information [actively using what is learned].

- The need for information to be presented in a variety of different ways [revisiting content at different times, in rearranged contexts, for different purposes, and from different conceptual perspectives].
- Supporting the use of problem-solving skills that allow learners to go “beyond the information given.” [developing pattern-recognition skills, presenting alternative ways of representing problems].
- Assessment focused on transfer of knowledge and skills [presenting new problems and situations that differ from the conditions of the initial instruction].

2.2.4 INSTRUCTIONAL STRATEGIES FOR LARGE GROUPS:

The strategies for large groups are –

- Just-in-Time-Teaching – In this strategies student are assigned web based warm up exercises. Instructors in the interactive lecture adjust/organize lessons based on student response. Collaborative recitation is held on alternating days from interactive lecture.
- Peer-reviewed research assignments – students in a group asked to draft a research paper exchange with other group for review.
- Group project/ mini conference – Groups are required to present their group project.
- Collaborative learning groups – Instructor assign a task to work on together.
- Fishbowl - Students are given index cards, and asked to write down one question concerning the course material. At the end of the class period, students deposit their questions in a fish bowl. The instructor then draws several questions out of the bowl (either then or at the beginning of the next class period) and answers them for the class or asks the class to answer them.
- Problem based learning - Instructor leads a whole-class discussion about student insights into a contextually rich dilemma or situation requiring extensive analysis that requires application of content previously learned by other means.

2.2.5 INSTRUCTIONAL STRATEGIES FOR SMALL GROUPS:

Following strategies can be implemented for small groups -

- Flexible Grouping - Flexible grouping is one method of differentiating instruction based on the achievement levels of the students.
- Nominal Brainstorming - Nominal brainstorming is a modification of brainstorming that gives everyone in a group the chance to respond.
- Think-Pair-Share - In this strategy, students are first assigned a question to which they compose an individual response. Next, they are placed in pairs and allowed to discuss, share, and combine their responses into a new response that reflects the thinking of both students.
- Cooperative Learning Groups - Cooperative learning refers to a set of instructional techniques in which students work together in small groups to complete an assignment or project. Students are assigned individual roles such as that of a facilitator, recorder, or time-keeper and are given the opportunity to share their knowledge of the topic.
- Flash Cards - Flash card is a writable surface with a question on one side and the answer on the other side. They reflect material from a particular unit. Either the teacher or the students may create them. Flash cards are extremely valuable tools for learning letters, vocabulary and symbols.
- Interview Group - Teachers arrange student-student interviews for two primary reasons. First, students interview one another using questions provided by the teacher to find out as much about the other student as possible during an ice-breaking activity. Second, students can also interview each other to share their explanations of a current curricular concept or about the content of a previous lesson.
- Discussion - Carefully planned group discussions promote student interaction, learning and higher level reasoning and they can target numerous instructional strategies such as inquiry, review, and problem solving. The two main types of discussions are guided and reflective discussions
- Learning Centers - Learning centers are specific areas within a classroom where the teacher has prepared a mini-lesson for the students to utilize.
- Jigsaw - One strategy for increasing student interaction while covering multiple topics is to implement a jigsaw. The jigsaw activity develops student-experts that share their

information with other students in a small group setting. To implement a jigsaw, students are arranged in small groups called “expert groups.”

- **Numbered Heads Together** - Numbered heads together is a good strategy for reviewing material, practicing vocabulary terms, reinforcing factual information, and assessing student knowledge. To begin this strategy, the teacher creates groups of four students. The students within a group are assigned numbers so that each student has a number from one to four. Next, the teacher asks the entire class a question and assigns the groups a set time to deliberate on the answer. The teacher then selects a number from one to four. The students from each group who were assigned that number answers the question for the remainder of the group.
- **RAFT** - RAFT is an acronym for Role, Audience, Format, and Topic. The RAFT strategy helps students to apply what they have learned by creating something from a new perspective. This technique also allows students to demonstrate their creativity and to think “outside of the box.”

2.2.6 INSTRUCTIONAL STRATEGIES FOR FORMAL GROUPS:

Following strategies can be implemented for formal groups -

- **Discovery learning** - In a discovery format, the instructor presents a novel situation, an interesting puzzle, a set of observations to explain, or an open-ended question that students explore in a largely self-directed manner.
- **Guided design** - In guided design students work in groups of four or five, and they are led through a complex sequence of steps to solve real-world problems, with the instructor providing feedback at each step.
- **Authentic learning** - Authentic learning focuses on complex real-world problems and their solutions. The instructor selects a problem that is ill-defined and that requires sustained investigation and collaboration.
- **Inquiry-based instruction** - In structured inquiry learning, students are given a problem to solve, a method for solving the problem, and the necessary materials, but not the expected outcome. In guided inquiry or inquiry-guided learning, students must also figure out a method for solving the problem.

- Project-based learning - Project-based learning begins with the assignment of one or more tasks that will lead to the creation of a final product.

2.2.7 INSTRUCTIONAL STRATEGIES FOR NON-FORMAL GROUPS:

For non-formal groups especially who learn in open and distance learning mode, there are several instructional strategies. Few of those are as follows –

- Self-Learning Material - Self-Learning Material (SLM) for Open and Distance Learning mode means and includes contents in the form of course material, whether print or in e- form, which is self-explanatory, self-contained, self-directed at the learner, and amenable to self-evaluation, and enables the learner to acquire the prescribed level of learning in a course of study, but does not include text-books or guide-books.
- Audio–Video Material - The audio-video lectures (AVL) supplement and complement the Self Learning Material and these are based on the curriculum structure.
- Online and Computer based Material - The digital content is available in accessible format such as Word Processing, Portable Document Format or E-Pub format.
- The Personal Contact Programme - The Personal Contact Programme (PCP) has been designed to help the learners some sort of orientation and guidance regarding the methodology of learning and provides condensed classroom counselling to cover the important and difficult topics of the course.

Ertmer, P. A. & Newby, T. (2018) believe that the critical question instructional designers must ask is not “Which is the best theory?” but “Which theory is the most effective in fostering mastery of specific tasks by specific learners?” Prior to strategy selection, consideration must be made of both the learners and the task.

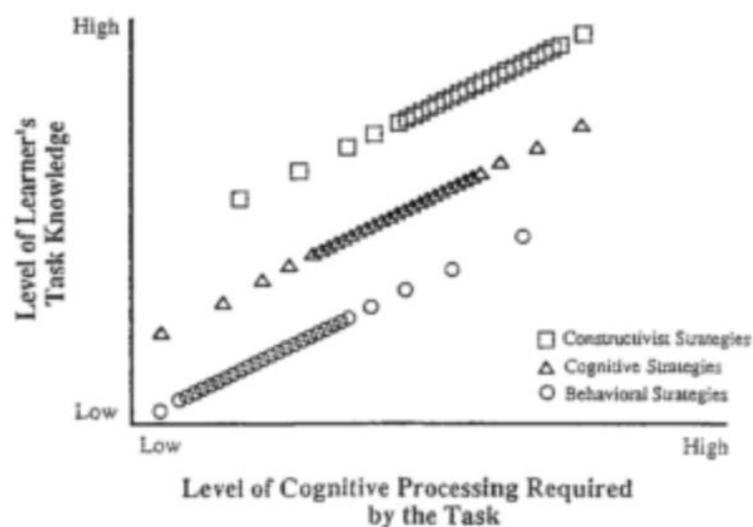


Figure: Comparison of the associated instructional strategies of the behavioral, cognitive, and constructivist viewpoints (Ertmer& Newby, 2018)

When integrating any strategies into the instructional design process, the nature of the learning task (i.e., the level of cognitive processing required) and the proficiency level of the learners involved must both be considered before selecting one approach over another. Depending on the demands of the task and where the learners are in terms of the content to be delivered/discovered, different strategies based on different theories appear to be necessary. Powerful frameworks for instruction have been developed by designers inspired by each of these perspectives. In fact, successful instructional practices have features that are supported by virtually all three perspectives e.g., active participation and interaction, practice and feedback.

LET US SUM UP:

There are different psychological approaches which influences educational technology as well as instructional strategies. The most important three approaches are behaviourist, cognitivist and constructivist. According to behaviourist approach knowledge is a repertoire of behavioral responses to environmental stimuli. Ivan Pavlov's classical conditioning and Skinner's operant conditioning played important role in behaviourism. Programmed Instruction is a teaching strategy that developed and grew along with advances in technology which is influenced by operant conditioning. Games and gamification also make use of Operant Conditioning principles. Cognitive theories focus on how our mental processes or cognitions change over time. Jean Piaget's cognitive development stages, Atkinson and Schiffrin' Information Processing Theory etc. played important role. On the other hand Constructivists emphasise the importance of consciousness, free will and social influences on learning. Lev Vygotsky's theory of social constructivism emphasized the importance of sociocultural learning.

Skinner's operant conditioning underlying theoretical basis for the development of teaching machines and computer-assisted instruction. Piaget proposed a theory of four stages cognitive development which will help the teachers to determine instructional strategies according to the level of cognitive development. Ausubel's concept of advance organizer and meaningful

learning help to design a successful instructional process. Bruner's concept of scaffolding, representation and spiral curriculum encourage active learning process. Vygotsky's Zone of Proximal Development (ZPD) plays important role in collaboration and interaction in a constructive learning environment. It is very important to consider both learners and the task before selecting instructional strategies in the line of behaviourism, cognitivism and constructivism.

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COR-313

EDUCATIONAL TECHNOLOGY

BLOCK-3

SYSTEMS APPROACH AND INSTRUCTIONAL DESIGN

CONTENT STRUCTURE:

Introduction

Objectives

3.1 Nature and importance of system approach in education:

3.1.1 Nature of system approach in education:

3.1.2 Importance of system approach in education:

Let us check our progress

3.2 Model of development of instructional design:

3.2.1: ADDIE

Let us check our progress

3.2.2: ASSURE MODEL:

Let us check our progress

3.2.3: Dick and Carey Model:

Let us check our progress

3.2.4: Mason's Model:

Let us check our progress

3.2.5: Gagne's Nine Events of Instruction

Let us check our progress

3.2.6: Five E's of Constructivism

Let us check our progress

3.2.7: Nine Elements of Constructivist Instructional Design

Let us check our progress

Let us sum up

Assignments

Suggested Readings

INTRODUCTION:

In the previous unit you have learnt about various theories of learning and their implications in the construction of instructional design. Instructional design basically a blue print which can guide an instructor or teacher to successfully conduction of the teaching learning process. Every teacher is confronted with the problem of individualsdifference in the classroom. Instructional technology is a growing field of study which uses technology as a systematic way to solve educational challenges in the classroom settings.

In this unit we will examine the concept of systems approach in detail. We shall, therefore, discuss the applications of systems approach to education and instruction.

OBJECTIVES:

After completing the unit, you would be able-

- To understand the meaning, nature and importance of system approach in education.
- To know about different models for developing the instructional design.
- To comprehend the ADDIE, ASSURE, Dick - Carey, and Masons Models of instructional design.
- To adopt the Nine events of instruction given by Gagne.
- To familiar with the 5E's of constructivist instructional approaches.
- To understand the nine elements of constructivist instructional design.

Block-3

Unit-1

Nature and importance of System approach in education

3.1: NATURE AND IMPORTANCE OF SYSTEM APPROACH IN EDUCATION:

As you know that system is an orderly grouping of independent components linked together according to plan to achieve a specific objective. In this sense the human body has a digestive system for digesting the food and converting it into nutrients. Various parts of the digestive system put separately do not constitute the digestive system. Now, what about the concept of the system approach? What are its nature and importance? Let us discuss.

3.1.1: NATURE OF SYSTEM APPROACH IN EDUCATION:

System approach is a systematic attempt to synchronize all aspects of a problem towards specific objectives. It is basically formed by two words which are system and approach. Its purpose is to ensure that the components of the organic whole will be available with the proper features at the proper time to contribute to the total system fulfilling the objectives.

The systems approach to education helps to design and study of teaching/learning situations based on the modern educational technology-related developments. In the context of education, system is a unit incorporating all its aspects and parts, namely, pupils, teachers, curriculum, content, and evaluation of instructional objectives.

As systems approach is basically a process of problem solving, it can be applied to many areas in the field of education, such as instruction, research, management of educational institutions, curriculum development and so on.

Now we are going to look on the nature of system approach in education-

- i) There are specific aims and objectives of system approach in education.
- ii) In the system approach of education, we must consider three parts (Input, Process and Output) with in the education system.

- iii) The parts or elements of education system must be interconnected.
- iv) In an education system there are many subsystems like examination system, administration etc.
- v) The various sub-systems of education should be studied in their inter-relationships rather, than in isolation from each other.

From the words of Hooper, the nature of system approach of education would be better understandable. Hooper (1971) said education is a system because it has a set of inputs (money, students, etc) which are subjected to a process (Teaching-learning) in orders to attain certain objectives which appear as outputs (educated students).

3.1.2: IMPORTANCE OF SYSTEM APPROACH IN EDUCATION:

Major importance of system approach in education is listed below:

- i) This approach helps in planning, decision making, and problem solving in the fields of education.
- ii) Adoption of this approach in education helps to guide the instructional process holistically.
- iii) Helps in improving examination and evaluation system.
- iv) It also helps to improve the quality of education.
- v) Helps improving teacher training programmes both pre-service and in-service.
- vi) Maximum utilization of resources can achieve with the help of system approach.
- vii) It throws lights on dynamic nature of management and administration of institution.
- viii) Finally, its helps in systematic educational planning.

So, the system approach can be used in education for the study of theories, to design remedial instruction, plan curriculum, for designing communication channels, to develop instructional system materials, for developing a training course for school administrators, for planning and administrating programmes for non-formal Education and for preparation of audio-visual aids.

LES US CHECK OUR PROGRESS:

- 1) Which of the following steps are involved in system approach in education?
 - a) Problem solving
 - b) Setting up objectives
 - c) Systematic thinking
 - d) All of these

- 2) The teaching-learning process is viewed as _____ and control taking place between the components of a system.
 - a) System approach
 - b) Communication
 - c) Planning
 - d) Developing

Block-3

Unit-2

Model of development of Instructional Design

3.2: MODEL OF DEVELOPMENT OF INSTRUCTIONAL DESIGN:

Over the past several decades, the field of instructional design (ID) has been heavily influenced by advancements in learning theories, communication theories, and computer technology. These advances are changing the discipline of ID rapidly as new understanding of how people communicate and learn, and of how technology can enhance learning and communication are emerging. As a result of all these, the field of ID has seen many models, some behaviourist, others cognitive or constructivist based.

An instructional design model provides guidelines to organize appropriate pedagogical scenarios to achieve instructional goals. It describes how to conduct the various steps of instructional design process. The models help trainers and educators to guide and plan the overall process.

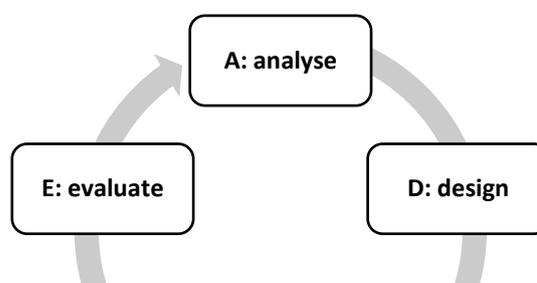
Let us discuss different models of instructional design mentioned in our syllabus.

3.2.1: ADDIE:

When it comes to instructional design models and theories, ADDIE is the most widely recognized name among professional learning designers. As we know that Instructional design has played as a fundamental role in the education and corporate sectors since its inception. Technology in education has also greatly influenced various instructional design factors, which includes the instructor , learner , beliefs about knowledge, instruction, and learning . The ADDIE model is a structure which is used by the instructor for the purpose of creating instruction. The concept of ADDIE was first developed in 1975 by the Centre for Educational Technology at Florida State University for the U.S. Army. Shortly after its inception, the ADDIE training model was adapted by the U.S. Armed Forces. Later, it used for effective training instruction in educational field which has five steps or phases. Now we are going to analyse five phases of ADDIE model-

Now we will elucidate the phases of ADDIE:

A: analyse



D: design

D: develop

I: implement

E: evaluate

Analyse:

This stage is characterised by goal setting stage. It establishes the instructional goal for the targeted outcome. In this phase, instructors differentiate between what the students already know and what they should know after completing the course. At the end of the program, instructional analysis will be conducted to determine what subjects or topics are to be included and according to that training plan is made.

Design:

In this stage learning objectives and learning outcomes are underlined. This phase also determines all goals, tools to be used to test performance, subject matter analysis, planning and resources. In the design phase, the focus is on learning objectives, content, subject matter, duration, element of the contents assessment types and tools. Basically in this stage decisions are made for best possible learning experiences.

Develop:

In this stage content is developed by the plans and instruction which was made in the design phase. Instructor makes use of the data collected from the two previous stages. We can see that the two previous stages required planning and brainstorming, this stage is all about putting those plans into action. This phase includes three tasks, namely drafting, production and evaluation.

Implement:

This phase is known as delivery phase as the instructor delivered learning services to the learner. Instructor plays a very active role in this stage, which is crucial for the success of this stage. Instructors should consistently analyze, redesign and enhance the product to ensure

effective product delivery. Consistent monitoring is a must phenomenon for this stage. When instructors and learners actively contribute during the implementation process, modifications can be made which made the whole design more effective and successful.

Evaluate:

This phase is one of the most essential phases of ADDIE model. In this phase aim of the design is checked and learning goals are achieved or not assessed very carefully. Feedback process in this stage made it more fruitful.

Moreover, we can say that each and every stage of the ADDIE process involves formative evaluation. This is a multidimensional and essential component of the ADDIE process. Throughout the evaluation phase the designer should find out whether problems relevant to the training program are solved, and whether the desired objectives are met and also continuous efforts are made to make this model successful by presenting effective and necessary changes in it.

LES US CHECK OUR PROGRESS:

- 1) What type of model you will describe as ADDIE?
 - a) Constructive design
 - b) Instructional design
 - c) Psychological design
 - d) Technological design
- 2) Find out the sequential steps of ADDIE model?
 - a) Approach , design, develop, implement, evaluate
 - b) Analyse , design , develop , implement, evaluate
 - c) Analyse , develop, design , implement, evaluate
 - d) Apply, design, develop, implement, evaluate
- 3) Learning objectives are outlined in which phase of ADDIE model?
 - a) Analyse
 - b) Design
 - c) Develop
 - d) Implementation
 - e) evaluation

3.2.2 ASSURE MODEL:

Assure model is developed by Robert he inch, Michael molenda and james.D. Russuel around the year of 1999. It is an instructional system or guideline that teachers can use to develop the lesson plans which integrate the use of technology. It focuses on the learner and the overall outcome of accomplishing learning objectives. Basically we can say that it is an enriched evolution of the ADDIE model. Another major characteristics feature of this model is that this instructional design mainly focus on the planning and conducting lesson which involve ICT and majorly focussed on learner's need. It is quite clear from the above analysis is that this model caters for specific needs of every learner rather than using general resources. Teachers prefer the ASSURE model because it is designed to be used for a few hours of instruction and for each individual student. Just alike ADDIE, this model also has few stages which are-

- i) A - analyse learner
- ii) S- state objectives
- iii) S- select methods, media and materials
- iv) U- utilize media and material
- v) R- require learner's participation
- vi) E- evaluate and revise

Here we are going to explain detail about every stage of ASSURE model –

i) Analyse learner:

The first step in the process is that the teacher must analyze the attributes of her/his learners. There should be a focus on those learner characteristics which are associated with the learning outcomes .It basically includes the attributes of the learners, such as age, academic abilities, gender, interests, Prior competencies, learning styles, such as auditory, visual, and tactile.

ii) State objectives:

After the analysis of the learner attributes, the teacher must state the objectives for the learning module. This statement consists of a specification of what the learners will be able to

do as a result of the instruction. The mark of a good set of learning objectives is conformity to the ABCDs of well-stated learning objectives. They are as follows:

- Audience – For whom is the objective intended?
- Behaviour – What is the behaviour or performance to be demonstrated?
- Conditions – What are the conditions under which the behaviour or performance will be observed?
- Degree – To what degree will the knowledge or skill be mastered?

iii) Select methods, media, and materials:

The second “s” in the acronym stands for select method, media, and materials. A systematic plan for deciding correct media must be selected. It consists the steps which includes selecting modifying and designing the material of the format.

IV) Utilize media and material:

This step in the ASSURE process concerns planning as to how instructor will utilize the technology, media, and materials that have selected. Utilization process must be followed in order to get maximum impact from it. It is important to follow the “five p’s” process to achieve this:

- a) *Preview the Technology, Media, and Materials*
- b) *Prepare the Technology, Media, and Materials*
- c) *Prepare the Environment*
- d) *Prepare the Learners*
- e) *Provide the Learning Experience*

v) Require learner’s participation:

It mainly provides the learner to test the lesson being taught. Correct responses should be reinforced. There should be activities included in the lesson which allow learners to respond and also they must get feedback.

vi) Evaluate and revise:

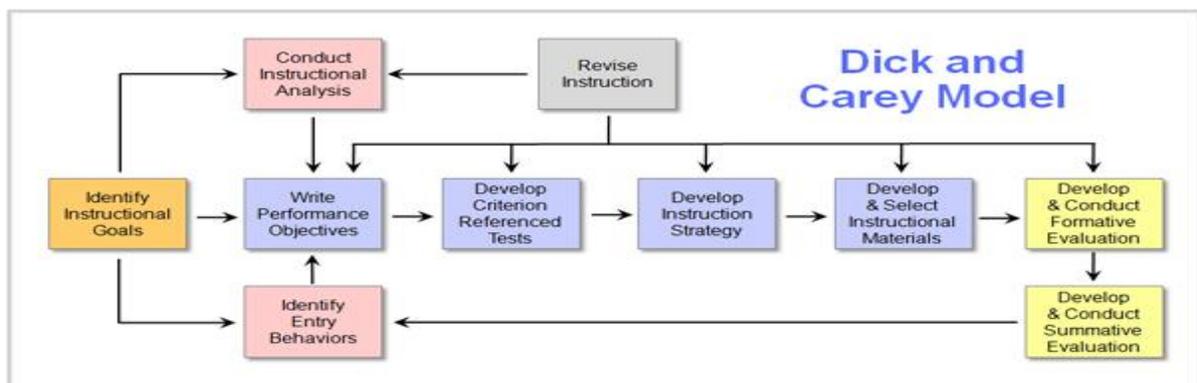
The final step in the ASSURE process is just as essential as all the others. In this step, instructor evaluates the impact of teaching on student learning. This includes an evaluation teaching strategy and the technology, media, and materials that are used by the instructor.

LES US CHECK OUR PROGRESS:

- 1) Who develop the ASSURE model?
 - a) Heinch
 - b) Moleda
 - c) Rusell
 - d) All of these
- 2) How many phases are present in ASSURE model
 - a) Two
 - b) Ten
 - c) Six
 - d) Five

3.2.3: DICK AND CAREY MODEL:

Instructional models can vary widely from one another. While some may focus on how to make the lesson plans and others focus on the delivery of the content itself, the Dick and Carey instructional design model (*also known as the Systems Approach Model*) is one of the former. Its goal is to improve the instructor. It has ten steps and it represents a set of procedures which refers as system. All ten steps are connected, and some influence others indirectly while they may influence others directly. The model is described in following image:



Now we are going to analyse the steps of this model:

Stage 1. Instructional Goals

The first step is to figure out the instructional goals. This means that the instructors are able to identify what it is the students need to learn. The goals can be derived from need assessment.

Stage 2. Instructional Analysis

Instructional analysis is the second step. This means that the instructor determining the skills that the students will need to learn what they plan to teach them in order to achieve the desirable goal.

Stage 3. Entry Behaviors and Learner Characteristics

Next what the instructor have to do is assess which skills the students have out of those that he/she previously determined are needed for this lesson. Here, learner's present knowledge and skill finally determine the instructional settings.

Stage 4. Performance Objectives

Next, instructor must figure out specific goals and objectives for the lesson. It basically brings together the work of the first three steps into a series of statements called performance objectives. Performance objectives cover three areas:

1. The skills to be learned
2. The conditions under which the skills must be performed
3. The criteria for successful performance.

Stage 5. Criterion-Referenced Test Items

The fifth thing instructor must do is to create a test (consistent with the performance objectives) that will reflect what the instructor hoping to teach the students. This model advocates for designing any learning assessments, such as the final quiz or knowledge test, *before* the learning content. The assessments should directly measure the learner's ability to meet the performance objectives.

Stage 6. Instructional Strategy

In this stage the instructor begin to outline the lesson plan. This means that now he/she will be able to demonstrate what they want them to learn, add activities, and decide how each segment will be done.

Stage 7. Instructional Materials

This stage is characterized by production of instruction. It includes instructional material, guidance for learner, teaching guide and so on. So here, instructor make sure that they have what they need ready for the lesson.

Stage 8. Formative Evaluation

Here, the instructor would have to evaluate how the lesson went. After the learning content has been drafted, it should undergo tests to determine shortfalls before a final implementation. Dick and Carey identify three types of formative evaluation that should be used in this step:

1. One-to-one evaluation.
2. Small group evaluation.
3. Field evaluation.

Stage 9. Revise instruction

In step nine, the data collected from step eight is used to revise and improve the learning content. It is used to re-examine the validity of instructional analysis and assumptions about the attributes of the learner.

Stage 10. Summative Evaluation

This step take place only after the instructions has been formatively evaluated and sufficient revision take place.

LES US CHECK OUR PROGRESS:

- 1) How many steps are included in dick and carey model?
 - a) Five
 - b) Six

- c) Ten
 - d) Eight
- 2) What is the ninth step of this model?
- a) Formative
 - b) Summative
 - c) Revise instruction
 - d) Goal identify

3.2.4: MASON'S MODEL:

Charlotte mason's philosophy regained its popularity in recent years mainly among the home schooling families. According to massonbelief that the child is a person and we must educate that whole person, not just his mind. So a Charlotte Mason education is three-pronged : in her words, "Education is an Atmosphere, a Discipline, a Life." In terms of home schooling her approach is:

- a) *Use of narrative literature*
- b) *Outdoor exploration*
- c) *Idea about art, music and nature*

Now we are going to analyse her method:

- i) Narration: Basically it is done by oral functioning. A activity where a child listening old story. This method is efficient and effective.
- ii) Picture study: Teacher shows pictures to the students from where they try to remember their old memories related to that image.
- iii) Nature study: observation of the nature by the student in the form of nature work done here. This type of study is good for old and young children
- iv) Scheduled free time: Masson give much importance to this method. Children need free time in order to pursue their interest and hobbies which will help the student in self directed learning as well.

LES US CHECK OUR PROGRESS:

- 1) Who gave mason's method:
 - a) Gagne

- b) Russel
 - c) Charlotte mason
 - d) Dick and Carey
- 2) In terms of home schooling how many approach she gave?
- a) One
 - b) Two
 - c) Three

3.2.5: GAGNE'S NINE EVENTS OF INSTRUCTION:

In the following we are going to discuss about Gagne's Nine Events of Instruction. In 1965, Robert Gagné proposed a series of events that are associated with and address the mental conditions for learning. Each of the nine events of instruction is highlighted below, followed by sample methods to help implement the events in your own instruction. Use Gagné's nine events in conjunction with Bloom's Revised Taxonomy to design engaging and meaningful instruction. The following steps have been adapted from Gagné, Briggs, and Wager (1992). Gagne clearly was not thinking about eLearning in 1965. However, his principles transfer to online environments well.

Gagne's Nine Events of Instruction have nine steps and they are discussed in following:

1. Gain attention of the students:

The first step of Gagne's Nine Events of Instruction is to Gain the attention of the students. To ensure the learners are ready to learn and participate in activities by presenting a stimulus to capture their attention.

2. State the Learning Objectives:

Gagne's 2nd event is that, learner should be informed what they are going to be learn. Inform students of the objectives or outcomes for the course and individual lessons to help them understand what they are expected to learn and do. Provide objectives before instruction begins.

3. Stimulate recall of prior learning:

The third step of Gagne's Nine Events of Instruction is to stimulate recall of prior learning. It helps students make sense of new information by relating it to something they already know or something they have already experienced.

4. Present the content:

The fourth step of Gagne's Nine Events of Instruction is to present the content. In this process use strategies to present and cue lesson content to provide more effective instruction. Organize and group content in meaningful ways, and provide explanations after demonstrations.

5. Provide learning guidance:

In fifth step of Gagne's Nine Events of Instruction advise students of strategies to aid them in learning content and of resources available. In other words, help students learn how to learn.

6. Elicit performance (Practice):

The sixth step of Gagne's Nine Events of Instruction check if students apply what they have learned to reinforce new skills and knowledge and to confirm correct understanding of course concepts.

7. Provide Feedback:

The seventh step of Gagne's Nine Events of Instruction provide timely feedback of students' performance to assess and facilitate learning and to allow students to identify gaps in understanding before it is too late.

8. Assess Performance:

The eighth step of Gagne's Nine Events of Instruction test whether the expected learning outcomes have been achieved on previously stated course objectives.

9. Enhance retention and transfer:

The ninth stage of Gagne's Nine Events of Instruction help learners retain more information by providing them opportunities to connect course concepts to potential real-world applications.

As we can see, Gagne mapped out each element necessary for an instructionally-sound learning experience. However, these nine events do not need to occur in the order that one has covered them in this article. Instead, one can incorporate these events at every step of your experience

— address the learner's prior knowledge whenever it makes sense to do so, incorporate attention-grabbing elements however one can, and include loads of practice and feedback for each objective. These elements should all be present, but there isn't a predefined structure that your experience must align to. Once one has memorized Gagne's 9 Events and you feel comfortable incorporating each event into your design, one will likely find that one becomes *much more efficient and confident with their instructional design*.

LET US CHECK OUR PROGRESS:

- 1) According to Gagne, what is most important in making effective instructional materials?
 - a) organisation
 - b) instructional theory
 - c) learning theory
 - d) events
- 2) From the following, which is not of the events in Gagne's 9 events of instruction ?
 - a) gaining attention
 - b) providing answers
 - c) assessing performance
 - d) enhancing retention and transfer
- 3) Which of Gagne's Nine Events of Instruction would have been displayed if we had given a formal assessment?
 - a) Providing Feedback
 - b) Assess Performance
 - c) Present the Stimulus
 - d) Present the content

- 4) Why is it important to gain the attention of students?
- a) To wake them up
 - b) Because there may be a test
 - c) To ensure learners are ready to learn and participate in activities
 - d) It is not necessary

3.2.6: FIVE E'S OF CONSTRUCTIVISM:

As learning environment evolves, learners have become increasingly demanding on personalised learning which allows them to build their own knowledge pathway. This significant change in learning requirements imposes a new learning paradigm which ensures learner-centred, with flexible mode of content configuration, and adaptive delivery and assessment. Scholars such as Jean Piaget, Eleanor Duckworth, George Hein, and Howard Gardener have explored these ideas in-depth. The philosophy about learning, that proposes learners need to build their own understanding of new ideas, has been labeled constructivism.

Constructivism implies comprehensive learning through experience, allowing students to apply new knowledge in new contexts. In the new approach of learning, Roger Bybee developed an instructional model for constructivism, called the "Five Es". He argued, the 5E Model of Instruction promotes active learning. Students are involved in more than listening and reading. They learn to ask questions, observe, model, analyze, explain, draw conclusions, argue from evidence, and talk about their own understanding.

The 5E Model of Instruction includes five phases: Engage, Explore, Explain, Elaborate, and Evaluate. It provides a carefully planned sequence of instruction that places students at the center of learning.

1. ENGAGE

In the stage Engage, the students first encounter and identify the instructional task. The activities in the Engage phase are designed to help students make connections between past and present learning experiences, organize thinking toward the essential questions and learning outcomes of the learning sequence.

The role of the teacher in the Engage phase is to present a situation, identify the instructional task, and set the rules and procedures for the activities. The teacher also structures initial discussions to reveal the range of ideas, experiences, and language that students use which become resources for upcoming lessons.

2. EXPLORE

Once students have engaged in activities, they need time to explore ideas. Explore activities are designed so all students have common, concrete experiences which can be used later when formally introducing and discussing scientific and technological concepts and explanations.

The teacher's role in the Explore phase as a facilitator, providing materials and guiding the students' focus. The students' inquiry process drives the instruction during an exploration.

3. EXPLAIN

The Explain phase consists of two parts. First, the teacher asks students to share their initial models and explanations from experiences in the Engage and Explore phases.

Second, the teacher provides resources and information to support student learning and introduces scientific or technological concepts.

4. ELABORATE

In stage four, elaborate, the students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them.

5. EVALUATE

In the final stage, students return to the engage phase to compare their earlier understanding of what they know now. This phase encourages students to assess their understanding and abilities and allows teachers to evaluate individual student progress toward achieving learning goals and outcomes.

The 5E Model helps students to use inquiry to connect new information with prior knowledge through practice and reflection. The teacher becomes a facilitator or guide who builds inquiry, exploration, and assessment into daily instruction approach.

Let us check our progress:

1. In this phase of the cycle, the teacher aims to assess student prior knowledge and/or identify possible misconceptions.
 - a) Exploration
 - b) Evaluation

- c) Elaboration
 - d) Explanation
 - e) Engagement
2. What are the 5E's in order?
- a) Engage, Explore, Explain, Elaborate, Evaluate
 - b) Engage, Explain, Explore, Elaborate, Evaluate
 - c) Explain, Explore, Engage, Elaborate, Evaluate
 - d) Engage, Explain, Evaluate, Elaborate, Explore

3.2.7: NINE ELEMENTS OF CONSTRUCTIVIST INSTRUCTIONAL DESIGN:

Constructivism is the theory that says learners construct knowledge rather than just passively take in information. As people experience the world and reflect upon those experiences, they build their own representations and incorporate new information into their pre-existing knowledge (schemas). It also suggests that the learning should occur in realistic settings using "authentic tasks." Some constructivists hold that ideally an authentic task "must contain no isolated tasks, must be [only] a real-world task, must be in context, and must involve no simplification of that context."

The development of constructivist models of teaching is specifically attributed to the works of Maria Montessori, which were further developed by more recent theorists such as David A. Kolb, and Ronald Fry, among others. These theorists have proposed sensory and activity-based learning methods.

Herrington and Oliver (2000) identified nine elements to design a constructivist instructional design. These are:

- 1) Provide authentic contexts that reflect the way the knowledge is applied in real life.
- 2) Provide authentic activities.
- 3) Provide access to expert performances and the modelling of processes.
- 4) Provide multiple roles and perspectives.
- 5) Support collaborative construction of knowledge.
- 6) Promote reflection to enable abstraction to be formed.

7) Promote articulation to enable tacit knowledge to be made explicit.

8) Provide coaching and scaffolding by the teacher at critical times.

9) Provide for authentic assessment for learning within the tasks.

The above elements are used in the design and development process in a specific context. The instructional designer also uses the reflective practice – reflection-in-action and reflection-on-action (Schon, 1987). Thinking about our work and what we are doing leads us to reformulate the problem/tasks in hand. The participation guidelines of the model are a little difficult to implement, as it proposes that the learners should be involved in the design process. However, a participatory design is highly significant and useful for specialized training in technical and behavioural aspects. It also improves learning due to ownership of the design by the participants.

LET US CHECK OUR PROGRESS:

- 5) Why is it important to gain the attention of students?
- e) To wake them up
 - f) Because there may be a test
 - g) To ensure learners are ready to learn and participate in activities
 - h) It is not necessary
- 6) The second of Gagne's Nine Events is?
- a) Inform students of the objectives
 - b) Assess Performance
 - c) Stimulate Recall of Prior Learning
 - d) Gain Attention of Students

LET US SUM-UP:

In this unit we have discussed on system approach. The system approach is a systematic attempt to synchronize all aspects of a problem towards specific objectives. It helps to design and study of teaching/learning situations based on the modern educational technology-related developments of education.

In the context of education, system is a unit incorporating all its aspects and parts, namely, pupils, teachers, curriculum, content, and evaluation of instructional objectives. It can be used

in education for the study of theories, to design remedial instruction, plan curriculum, for designing communication channels, to develop instructional system materials, etc.

Later we have studied about different models of instructional design. An instructional design model provides guidelines to organize appropriate pedagogical scenarios to achieve instructional goals.

Psychologists and educationists have designed various models which can help an instructor to effectively transact their instructional objectives to the learners. Some of the important model of instructional designs has been discussed namely, ADDIE, ASSURE, Dick and Carey, and Mason's Model. We also discussed on the Gagne's Nine Events of Instruction, Five E's of Constructivism and Nine Elements of Constructivist Instructional Design. Those are very systematic ways to effective conduction of an instructional strategy.

ASSIGNMENTS:

- a) What is the importance of system approach in education?
- b) Discuss the AUDDIE model of instructional design.
- c) How Gagne's Nine Events of Instruction can help to conduct an instructional session?
- d) Briefly describe the principles of instructional design identified in ASSURE model.
- e) Analyse the contribution of constructivists in the instructional system of education.

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COR-313

EDUCATIONAL TECHNOLOGY

Block-4

APPLICATION OF COMPUTERS IN EDUCATION

CONTENT STRUCTURE:

Introduction

Learning Objectives

4.1 Various Application of Computers in Education

- 4.1.1 Concept of CAI
- 4.1.2 Concept of CAL
- 4.1.3 Concept of CBT
- 4.1.4 Concept of CML
- 4.1.5 Process of Preparing ODLM
- 4.1.6 Concept of e-learning

4.2 Approaches to e-learning in Education

- 4.2.1 Offline Learning
- 4.2.2 Online Learning
- 4.2.3 Synchronous
- 4.2.4 Asynchronous,
- 4.2.5 Blended learning
- 4.2.6 Mobile Learning

Let us sum up

Assignment

Suggested Reading

INTRODUCTION:

This unit mainly deals with the use of computer for education and training. Computers have revolutionized the way we collect, process, store and disseminate information. The computer can be used for a variety of purposes, from - - - teaching basic computation to managerial skills. The computer not only uses as **an** educational medium but also it is used in administration and cost consideration. The 1930s saw the development of ‘teaching machines’ for effective learning. Then followed the use of computers in education. There are a number of terms such as computer-assisted learning (CAL), computer assisted instruction (CAI), computer-managed learning (CML), etc., which are used to connote the use of computers in education. These terms are many a time used interchangeably. In this Unit, an attempt has been made to enable you to learn about the concept, and application of CAI, CML, CBT in education. The unit also highlights the concept and different strategies of e- learning. ODL is an important alternative form of education. The success of open and distance education system depends mainly on the quality and effectiveness and of its teaching-learning materials in print. Distance teaching-learning materials are popularly called self-instructional materials (SIMs) or self-learning materials (SLMs). The unit also deals with different aspects of designing SLMs.

LEARNING OBJECTIVES:

After end of this unit the learners will be able to do the following behavior -

- ❖ define the terms of CAI, CAL, CBT & CML
- ❖ list the major features of CAI, CAL, CML and CBT;
- ❖ state the application of CAI, CAL, CML & CBT in education
- ❖ distinguish between various applications of computers in education
- ❖ describe the process of preparing ODLM
- ❖ explain the concept of e-learning
- ❖ discuss the different strategies of e- learning

Block-4

Unit-1

Various Application of Computers in Education

4.1.1 COMPUTER ASSISTED INSTRUCTION:

Computer-assisted education is one of the most valuable gifts of today's digital age. The Computer has contributed a lot in each and every sector of life especially in education sector. The idea of using technology to enhance education has been around for a long time. Back in 1928, courses began being offered through radio. Using television as an educational tool slowly began to grow and in the 1950s. Throughout this time period, computers began to filter more into the education world. Computer-assisted instruction (CAI) is an instructional method that has been developing for over 40 years (Liao, 2004). In 1959 at the University of Illinois the first large scale uses of a computer assisted instruction (CAI) system. CAI systems continued to be developed throughout this time period. It was not until the nineties, when computers took on a newer, more efficient structure, became faster and more multifunctional (Harting&Erthal, 2005), did society really began to consider their potential in education. By the beginning of the twenty-first century, computers were fully implemented into educational institutions and being utilized in a variety of ways.

Definition, Meaning of Computer-Assisted Instruction (CAI)

Computer plays an important role in different fields of education. CAI plays very crucial role in teaching effectively. The term CAI is the use of a computer to provide instruction. Computer-assisted instruction (CAI) is a narrower term and most often refers to drill and-practice, tutorial, or simulation activities offered either by themselves or as supplements to traditional, teacher directed instruction. The studies indicated that as a medium of instruction computer-assisted instruction may be beneficial for teaching and learning. The three major types of CAI are drill and practice, tutorials, and simulations.

Chamber & Stretcher (1983): “CAI is the use of a computer to provide classroom instruction and course content in the form of drill and practice, tutorials and simulation.”

Bhatt & Sharma (1992): “CAI is an interaction between a students, a computer controlled display and a response entry device for the purpose of achieving educational outcomes.”

Singh (1997):“Use of computer to assist in the presentation of instructional material to a student to monitor learning progress or to select additional instructional material in accordance with the needs of individual learner.”

Jurich& Cotton (2001):“Computer Assisted Instruction (CAI) is a program of instructional material presented by means of a computer or computer systems. Drill and practice software is generally called Computer-Assisted Instruction.”

Seo& Bryant (2009): Computer Assisted Instruction (CAI) is “defined as the use of a computer to provide instructional contents.”

So, CAI is a method of instruction in which there is a purposeful interaction between a learner and the computer device (having useful instructional material as software) for helping the individual learner achieve the desired instructional objectives with his own pace and abilities at his command. CAI is the use of a computer to provide instruction. Computer Assisted Instruction is nothing but giving instruction with the help of computers. CAI has been developed from the principles of Programmed Instruction. CAI is nothing but learning with computers. It can be used to impart formal and Non-Formal Education at all levels and also in all areas. It is one of the type of Individualized Instruction. In CAI, the activity of the learner is the most important attribute.

CAI – Different Terminology

As in any field of education, acronyms abound in the Computer Assisted Instruction/Learning domain. Terms vary in their definition or the breadth of their specificity. This shows a brief list of some of the key terms used in CAI related fields.

CBT- Computer Based Training	New Terminology <ul style="list-style-type: none">• Web Based Training• Web Based Learning• Web Based Instruction
CML- Computer Managed Learning	
CAI - Computer Assisted Instruction	
CAI - Computer Aided Instruction	
CAL - Computer Assisted Learning	
CALL- Computer Assisted Language Learning	
WBI- Web Based Instruction	

Basic Principles for Developing CAI:

CAI is one of the styles of programmed instructions. Basic principles of programmed instructions are used for developing CAI. These principles are:

- Principle of small steps
- Principle of active responding
- Principle of active responding
- Principle of immediate feedback
- Principle of self-pacing
- Principle of evaluation

Features of Computer-Assisted Instruction (CAI):

The following are the distinctive features of CAI:

- **Active responding:** There is active participation on the part of the student. He is likely to give an active response. He has to construct response for every frame.
- **Controlled responses:** Responses are controlled by the researcher. The student has no choice of his own to respond in his own way.
- **Response is emphasized:** The student must respond to each and every frame for effective learning.
- **Constructed Responses:** The student has to construct his responses. He is required to fill in a missing word to answer a question.
- **Self-pacing:** The learner completes the programme at his own speed. He is not compelled to work with the speed of other students of the class.
- **Immediate Feedback:** Immediate Feedback is an important feature of CAI.

Advantages of CAI:

In the view of McKethan (2001) “Technology in the information revolution has provided many unique benefits to instructional programs. Although traditional ways of instruction are widely accepted in teaching and learning environments, some educational institutions have started to implement computer technology as an instructional approach”. Research evidences have shown that CAI has a significant impact on the teaching learning process. Those are:

- It increases the level of satisfaction of the learners
- It helps to improve thinking Skills
- It reduces time and Cost to tolerable Level
- It helps to improve the thinking skills of the students
- It helps tom gain higher academic achievements
- The use of CAI increasesthe learning ability of the students

Limitations of CAI

- Experts Needed in CAI - Compute aided instructions need the help of the following experts:
 - i) Computer Engineer – A computer engineer is a technical person and knows about basic principles and techniques of programming.
 - ii) Lesson Writer - The lesson writer is an expert who is familiar with lesson writing. Lesson writers may be experienced teachers or an experienced teacher may be a lesson writer. He knows theories of learning.
 - iii) System Operator – He knows the system thoroughly and can cope with all commonly thoroughly and can cope with all commonly occurring failures of software and hardware in the system.
- The computer fails to appreciate the emotions of students. The emotional climate created by teacher in direct class room interaction with the students is absent in CAI.
- CAI programs do not in themselves solve psychological or educational problems. Computer programmes of conventional type do not work like human beings at all.
- CAI fails to develop essential features of language competency where the ability to generate or construct meaningful sentences is essential.
- It was pointed out that some students got more tired than conventional study or felt like quitting the study.
- CAI cannot appreciate the student’s artistic endeavor and cannot strengthen his

friendship and deepen his perception of those around him.

4.1.2 COMPUTER ASSISTED LEARNING (CAL):

In Computer Assisted Learning (CAL), the learner operates as an autonomous individual and as far as the content of instruction is concerned he/she seeks assistance, or it is given according to his needs. CAL deals with flexible, rapidly changing and detailed information, and is essentially more than a means of administering programmed instructional material, even though the computer can function as a tutor with unlimited patience. Computer Aided Learning (CAL) or Computer Assisted learning can be defined as learning or teaching subjects like mathematics, Science, Geography, and etc., through computers with subject wise learning packages/materials.

- It may include all types of Technology-Enhanced Learning (TEL), where technology is used to support the learning process.
- It is said to be: “Pedagogy empowered by digital technology”.
- In broader sense, it may be considered as a part of E-Learning.

CAL 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.

Types of CAL:

- **Tutorials:** Tutorial software provides information about diverse topics, essentially taking on the role of the instructor. In many cases, the technology quizzes and evaluates the student’s comprehension of the subject matter using an interactive process and delivering feedback.
- **Gamified Learning:** This type of CAL uses a gamified approach to help students learn the material. Through an interactive process, students may advance to new levels after demonstrating that they’ve grasped certain concepts or receive rewards along the way.
- **Practice:** Practice technology applies a digital approach to traditional methods of learning content, such as flashcards. The technology, for example, might quiz learners on different concepts.

- **Demonstrations:** Demonstrations tap into different senses, like visual and auditory, to present facts, information, concepts, and more. In some cases, students can become “immersed” in the experience, as is often the case with virtual or augmented reality technologies, both of which are used in teaching and learning.

Features of CAL:

- Personalizing information increases the learner’s interest in the task.
- Animating objects help in better understanding of the concept
- Learners are provided choices over their own learning.
- Fantasy context are provided that facilitate engagement.

Advantages of CAL:

- **It Caters to the Individual:** With CAL, each student can go at their own pace and make progress in their own time. Computer lessons or games normally adapt to the individual based on their own progress, not on a set standard, so each student is able to have a more personalized experience.
- **It Promotes Active Interaction and Use of Target Language:** It is fine to sit in class and repeat words and make verb charts, but the real learning comes when you use that knowledge in a real situation. Students who actively using the language they’re trying to learn helps them remember certain words or phrases better.
- **It Lets Students See Their Progress:** Again, the feelings of success and satisfaction are key to encouraging students to want to learn more. Because of this, CAL is a great method to use in the classroom. Students can easily see the progress they’re making. Every time they solve a puzzle or get to the next level in a game or an online course, they feel as if they’re doing well, which keeps them engaged in the lessons.
- **It Breaks Down Complex Topics into Smaller Pieces:** Sometimes it’s tough for teachers to break down complex topics because they don’t know the best way to go about it. Computer games and lessons do this for you, however, and break down material into bite-sized chunks that can be learned and retained more easily.
- **It’s Interesting and Engaging:** Let’s be real: A bored student isn’t a good one. While some students adore lectures, many others require more stimulation to stay involved and actively learning. CAL is perfect for this, because it offers many ways for each individual student to engage and stay interested in the topic at hand.

Disadvantages of CAL:

- **It Can Be Expensive:** Cost is perhaps the biggest barrier to using CAL in the classroom. Computers, electronic devices and software are expensive. As such, having a computer for each student is just not a realistic goal for some classrooms.
- **It Can Be Difficult for Teachers to Implement:** Any time electronics become involved in something, it gets more complicated, at least initially. Teachers have to learn how to use the tech themselves before they can have their students use it, and sometimes the proper training can take up a lot of precious time. We have all had that teacher who wastes a bunch of time during the lesson because they don't know how to use the computer or the overhead projector... no one wants to be that teacher!
- **CAL Activities Don't Always Fit the Teacher's Goals:** When using third-party programs, videos or lessons, it's sometimes hard to find one that exactly fits your needs or teaching style. There are going to be times when an online quiz doesn't have the exact words you want to test for, or that the video you are watching uses every part of speech you need to highlight. Teachers have to find a way to integrate CAL into their lessons without letting it dictate the material to be learned, and sometimes finding the balance can be tough.
- **It Can Lead to Isolation Among Students:** While an individual, personalized learning experience is a good thing, the isolation it can lead to is not. Just imagine a classroom full of students, each at their own computer, not looking at each other and only interacting with that computer in front of them. Socializing is an important part of language use, and we learn new things about language from interacting with each other. Students need other students to help them learn, and CAL can inhibit this.

Still, CAL can be an incredible teaching resources when integrated into the classroom. By using it to supplement your curriculum rather than dictate it, CAL can transform the ways students learn languages—or learn anything, for that matter!

4.1.3 COMPUTER BASED TRAINING (CBT):

The success of the use of the computer in the school and educational set up has resulted in its use for industrial and military training. In fact, this is now more predominant and is often referred to as computer-based training (CBT). CBT is an approach to solve performance problems through training, which is essentially individualized. A typical CBT enables the learners to acquire the knowledge and skills that comprise competence in task

performance. However, it is similar to CAI in its design. Some call it Technology Based Training (TBT) as well.

Concept of CBT:

CBT is a structured training and assessment approach that allows individuals to acquire the skills and knowledge to perform simple or complex tasks to a specified standard. CBT is focused on: (1) the performance of tasks and duties by an individual; (2) the conditions in which they are to perform these tasks and duties; and (3) the standard to which they are to perform. CBT is an outcome-based learning system for developing curricula. Training and assessment is centered around learners achieving certain competencies according to clearly defined criteria and undertaken within workplace-like conditions. CBT is, therefore, a form of training that is specifically focused on achieving competence. Training is typically divided into small units that are dedicated to the mastery of a specific competency, and articulated together into more complex structures. Once students are able to demonstrate the mastery of a given competency, they then proceed to the next unit.

CBT is replacing traditional training and learning methods, which are often undertaken within a course or subject. These have tended to mostly focus on knowledge without the mastery of real-life industry skills or any consideration for labour market performance. Instead, CBT attempts to be market-relevant, since it is based on information about the needs of the labour market and, in return, signals to employers the available skills and employability of jobseekers.

The demonstrated ability to apply knowledge, skills and attitudes in order to successfully complete work activities to a defined standard of performance, as expected in a real-life workplace environment.

Advantages of CBT

There are many advantages to CBT. But following seven key areas are most frequently mentioned by advocates of CBT as the biggest advantages of CBT.

- **Learn at Their Own Pace:** A clear advantage of training associates individually is self-paced learning. Each associate has the opportunity to learn at his or her own pace. The associate is not required to master the material within a predetermined period of time. If the associate is very familiar with the material, he or she can move at a very fast pace. If the material is more challenging, more time can be taken. This makes the

training experience much more positive for each individual. Each associate can also easily apply bookmarks if the training is interrupted at any point. These advantages are also very significant.

- **Easier Record Keeping:** CBT offers the distinct advantage of facilitating the recordkeeping process. As each associate completes the training module, the information is recorded in a database tracking system. Furthermore, recorded results of quizzes and tests demonstrate the degree to which the material has been mastered. This is a clear advantage over the detailed, and to some extent manual, recordkeeping process for traditional classroom training. In this regard, the computer does the work of capturing the information. The compliance department can then monitor educational progress on a daily basis.
- **Reduction of the Need to Train Live Instructors:** CBT in most cases eliminates the need for the organization to train instructors. Often times, the educational approach in many organizations is to “train the trainer.” This can be both an expensive and time consuming process. Individuals who receive the initial training are usually high-level department directors who must spend a considerable time mastering the material so that they can in turn present to other individuals. This has often times resulted in an expensive and less-than-effective training process. By utilizing CBT, the organization doesn’t have to worry about “training the trainer.”
- **Ability to Provide Frequent Updates:** BT provides the capability to update the material as frequently as necessary. Because the health care environment is constantly changing, there is new information to be provided on a particular topic on a very frequent basis. Under the traditional classroom-training scenario, updated information would only normally be incorporated on an annual basis. CBT, on the other hand, allows for immediate updates.
- **Consistent Content for Everyone:** A significant advantage for CBT is that a consistent message is provided to everyone who receives the training. If classroom training is used, there can be multiple trainers who each present the material a little bit differently. Under CBT, everyone is receiving the same message.
- **Ability to Train a Substantial Number of People in a Short Time:** A major advantage to CBT is the ability to train a large number of people in a short period of time. We are aware of an organization that was under a CIA order to train over 1,600 employees in 120 days. This would have been an extreme challenge to perform with a

traditional classroom training approach. By using CBT and mandating that each associate complete the training within the time limit, this onerous requirement was met successfully.

- **Tutorial:** Activity based tutorials of shorter duration that provide information for understanding and allows higher retention of knowledge.
- **Drill and Practice:** It allows mastery learning through drill and practice.
- **Learning by Closing:** CBT can provide complete experiential learning and a learner can develop skills by working on models and simulated projects.

Disadvantages of CBT:

- **Accessibility:** One key disadvantage of CBT is accessibility. As difficult as it is to believe for most of us, not everyone has access to a computer terminal either at work or at home. This is particularly true in the hospital setting. This is a problem that is resolvable, but it is a potentially significant problem when CBT is mandated for everyone.
- **Lack of Human Interaction:** The lack of human interaction can be an issue with CBT. There is no question that traditional classroom instruction offers face-to face learning that many people are more comfortable with. People like to ask questions and get them answered immediately. In the classroom environment there is instant feedback regarding questions and other discussion issues. This environment also helps prevent misinterpretation of information by allowing for immediate discussion of anything that is not clear.
- **People with Limited Computer Aptitude:** We also shouldn't forget that there are individuals that are not computer literate and are intimidated by the utilization of computers. Yes, they can learn to use the computer, but they usually don't feel totally comfortable, and that fact alone impacts their learning experience. This is an important consideration when making the decision to discontinue the classroom style learning methodology.

4.1.4 COMPUTER MANAGED LEARNING (CML):

The Computer Managed Learning is an electronic management information system of a student learning. It is a significant application of computer technology for accountability and

documentation of student progress by electronic filing, sorting, and reporting of his learning outcomes.

Computer-managed learning (CML), nevertheless, is a significant application of computer technology. It is one of the most rapidly growing areas in computer-based education. Computer-managed learning (CML) is not to be confused with computer-assisted instruction (CAI), computer-assisted learning (CAL), computer-based instruction (CBI), or computer-based learning (CBL). It is, however, often referred to as computer-managed instruction (CMI). When discussing computers and education, if one remembers that learning and instruction generally refer to the same thing, a good deal of the confusion between different terms is often eliminated. According to Dennis this is a result of three factors:

1. Growing realization of the level of effort required to deliver adequate computerized instruction. Early conceptions of instructional use of computers grossly underestimated the complexity of the learning process. They also underestimated the level of hardware and software resources required to deliver adequate computerized instruction.
2. Declining school resources coupled with growing demands for accountability, and
3. Early attempts at individualized instruction helped to formulate a conception of the magnitude of the management task required to monitor and to facilitate this style of instruction (Dennis, 1979).

Definition and Meaning of CML

CML has both a broad and narrow meaning. In the broader sense, CML refers to the following definition: CMI in its most sophisticated levels provides the following instructional functions.

1. Assesses the learner's present level of knowledge,
2. diagnoses weakness or gaps in the student's learning,
3. prescribes learning activities to remediate the identified weaknesses, and
4. Continuously monitors progress of the learner. (Mitzel, 1982).

... (CMI) in its least complex application is relatively simple, relying principally on the record-keeping and summarizing power of the computer to assess, diagnose, prescribe, and monitor each learner's progress (Mitzel, 1982).

Hofmeister (1982) defines “CML as the systematic control of instruction by the computer. It is characterized by testing, diagnosis, learning prescriptions, and thorough record-keeping” (Hofmeister, 1982, p. 118).

According to **Tait & Hughes, (1984)**, “CML is an electronic learning management system that allows data from tests to be analyzed, providing information which can be the basis of educational decisions”.

Gorth & Nassif, (1984) Computer-managed instruction (CMI) is the use of computer technology to collect, analyze, and report information concerning the performance of students in an educational program.

Wesson, (1983) defines CML as a system to monitor student progress and the effectiveness of their instruction.

According to **Hartmann (1989)** CML as a record keeping system or information management system is a significant improvement over manually based operations.

According to **Splittergerber and Stirzaker(1984)**, CML is defined as: ... an instructional management application utilizing the computer to direct the entire instructional process, including CAI format as well as the traditional forms of instruction which do not require computers, for example, lectures and group activities (Splittergerber & Stirzaker, 1984, p. 38).

So, CML will refer to the storage of data (personal, vocational, and academic) of individual students for the purposes of record-keeping, instructional decision making, facilitating more efficient report writing, and satisfying political and government bureaucratic requirements. CML as a record keeping system or information management system can be a significant improvement over manually based operations. It helps to assess the learner's present level of knowledge. It diagnoses weakness or gaps in the students learning. It prescribes learning activities to remediate the identified weakness and continuously monitors progress of the learner. It is an improvement over manual performance record system. It uses computer technology to collect, analyze and report information concerning the performance of students in an educational programme. It is a system to monitor student's progress and the effectiveness of their instruction.

Application of CML in Education:

Effective implementation of educational programs implies effective management or information. Well-designed CML systems are, then, tools to assist educators in maintaining pertinent and accurate information that will help the educator monitor the educational process. Special education, with its unique student population, has utilized CML more extensively than other areas of education. The emphasis on individualization and a real need for accurate record keeping (legislation) has literally forced special educators into investigating the possible labor saving advantages of implementing a computer-managed learning program. CML can save time, money, and bureaucratic headache. In the field of special education, educators use CML. According to **Griffith-Sheriff and Walter, (1981)**, CML plays following roles in the field of education:

- It helps in storing demographic and educational information on students and their needs.
- It helps in recording, monitoring, and reporting student progress.
- It helps in listing incomplete information on student records.
- It helps in recording contacts with parents and supporting agencies/personnel.
- It helps in recording, monitoring, and reporting student due process status.
- It helps in generating reports on referrals, meetings, evaluation, placement, programming and review for each student.
- It helps in locating, describing, and recommending appropriate materials based on individual student needs.
- It helps in generating IEP objectives from a large data base and Issuing reminders for when reports are due.

4.1.5 PREPARATION OF ODL MATERIAL:

Open and Distance Education has become a major intervention to increase access, equity and quality in education. Over the years, it has been seen that printed learning materials are the mainstay of distance education all over the world, and more so in the developing world. Due to the high quality of the printed text materials supplied to the learners, distance education has been successful in establishing a reputation of its own...The printed study material is the master medium that is supplemented by the use of other media and technologies, such as radio, television, audio-cassettes, video-cassettes, teleconference, interactive radio, World Wide Web, etc. In spite of the tremendous developments in the

technology front, the printed study material is still the most predominant mode of teaching and learning in the distance education system. In India, the use of printed study material in distance education is all the more important due to poor access to technology amongst the learners with diverse backgrounds. It is also cheaper in comparison to other media available for delivery of learning materials.

Characteristics of Self-Learning Materials (SLMs)

SLMs differ from text book, or an article of a journal. SLMs are learner centered and prepared for a specific group and tools for learning. The major characteristics of SLMs are as follows:

- **Self-explanatory:** The learning material is presented in simple, conceptually clear manner so that the distance learners learn on their own. Thus, SLMs facilitate self-learning on the part of learner, and no external mediation is required in principle.
- **Self-contained:** The material is generally sufficient to the topic under presentation, so that distance learners need not search for additional material to understand the topic and face examination. This care has to be taken by the planners of the programme and the course writer concerned. Otherwise, the distance learner will be at disadvantage in searching for material and not able to find the same within his/her reach.
- **Self-directed:** All the functions performed by a teacher in the classroom like teaching, guiding, motivating, instructing etc., have to be done by SLMs for distance learners. Thus, the material should direct the complete teaching-learning process with the help of explanations; illustrations, activities etc.
- **Self-motivating:** Distance learners and teachers are separated by physical distance and the learning materials are the main source of motivation. SLMs should elicit curiosity, encourage, raise issues and relate knowledge to local situations and make the learning process productive, meaningful and joyful.
- **Self-evaluating:** In the absence of a teacher in front of distance learner, self-assessment questions, activities, check your progress questions and feedback through them given in the SLMs provide the learners the scope to assess their progress, reinforce learning, and encourage them for further learning. Therefore, the learning materials should provide for self-evaluation and feedback for both correct and incorrect responses of the learners.

Thus, self-learning materials have to be prepared in such a way that the learners interact with the material and learn better. This characteristic of the SLMs is known as 'learning activeness'.

Various access devices in the SLM unit like structure, objectives, introduction, etc. help the learners to access the material appropriately. While interacting with the unit, learners note down the points, relate the matter to earlier knowledge, apply the concept to a new situation, complete self-assessment question exercises, and write assignment responses.

Self-Learning Materials (SLMs) and Textbooks:

Textbooks	Self-Learning Materials
Written for wider market	Written for specific target group in view
More teacher and subject oriented	Fully learner centered
Structure and objectives are not always mentioned	Structure and objectives are mentioned always to help learners
Learner needs support to understand the content	Learner understands the content on his/ her own without further support
Self-check questions are not given within the body of the text	Self-check questions are an integral part of all SLMs
Language used is formal and impersonal	Language used is informal, simple and personal

Comparison of ODL materials and Textbooks:

Self-learning materials (SLMs) are presented in such a way so as to help distance learners learn independently and effectively. SLM carries out all the functions of a teacher, like motivating, encouraging, explaining, provoking, assessing, providing feedback etc. Let us briefly identify the differences between text-books and self-learning materials

ODL materials differ from other learning materials – in particular, traditional textbooks

ODL materials ...	Textbooks typically ...
Typically are divided into study units, sometimes representing a week's work	Typically are divided into chapters, based on topics rather than study time

Include a study guide on how to use the materials and how to study by oneself	Do not include study guides or study guidance
Include study tips (e.g., on note-taking)	Do not include study tips
Include examples	Include examples
Include diagrams and pictures	Include diagrams and pictures
Include numerous activities	Have few or no activities
Provide feedback on answers	Do not provide feedback
Are tightly structured	Are more loosely structured
Address the learner as 'you'	Use passive language (e.g., 'it can be seen that' or 'the reader will note that')
Have a generous layout, often including space for learners to write in	Have pages filled with text, figures, tables, lists and other graphic elements – there is no space for learners to write in
Have as an audience the individual learner	Serve a dual audience: the learner and the teacher
Attempt to meet all the needs of the learner	Assume that the learner has a teacher who will be able to amplify the printed text

Process of Material Development for ODL System:

The main characteristics of SLMs are incorporated with the help of many components. Each topic/unit of SLMs presented in a course start with a structure. At IGNOU a Programme (P) has few Courses (C). Each course consists of 4 or 5 Blocks (B). A booklet is known as a block and represents a main theme related to the course concerned. Each block has 4 or 5 units/topics, dealing with inter-related sub-themes/sub-topics. Since a unit forms a basic part of a block of any course, the focus here is on the process of preparing an SLPM unit. Usually each self-learning unit outline also known as unit structure. This is also known as 'concept map' **Components of a Unit are as follows:**

Programme

C — Course

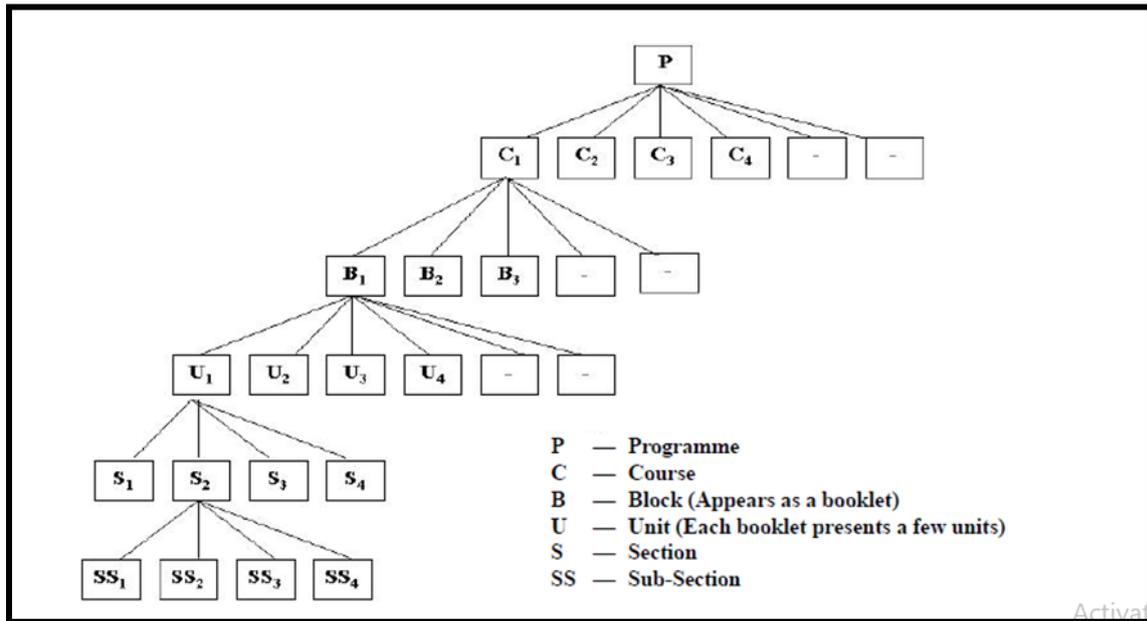
B — Block (Appears as a booklet)

U — Unit (Each booklet presents a few units)

S — Section

SS — Sub-Sections

Diagram: Hierarchical Linkage parts of SLM



Source: IGNOU (2008). Manual for Course Writers

The process of preparation of an SLM unit can be conveniently divided into three stages. They are:

- i) Arranging topics (concept mapping);
- ii) Preparing unit structure; and
- iii) Writing the unit.

1) Arranging Topics (Concept Mapping):

The first and the foremost task in writing learning materials is to select topics or identify all the relevant concepts and learning activities and arrange them in the most possible logical sequence. The topics, the concepts and the learning objectives are interrelated. A topic tells us what the subject or the point of the presentation is; and the topic may have many concepts. The objective(s) of the unit determine(s) the depth and extent of coverage of topics and concepts and

vice-versa. Identifying and arranging topics provide the writer the 'concept mapping' of the unit contents. The concept mapping is a process in which the unit-writer identifies key concepts and sub-concepts in a body of subject matter and arranges them meaningfully around the focal point.

A typical concept map contains three elements: Concept, Proposition & Hierarchical structure.

2) Unit Structure:

In distance education a unit describes a unified theme of knowledge. Different topics are covered in each unit. Each unit is self-contained. The unit structure helps the student understand what constitutes the unit. The unit structure helps the student not only to have easy access to the desired learning point in the unit but also to skip or skim the point according to his/her needs and requirements. The unit structure presents a clear outline of how the content or the learning activities are conceptualized and presented by the course writer. The unit structure with clearly differentiated and logically arranged learning activities makes the text more learner-oriented. A typical unit structure, in general, includes the following:

Unit V: Application of Computer in Education

Unit Structure

5.0. Introduction

5.1 Objectives

5.2 (Main topic I)

5.2.1Sub-topic 1

5.2.2Sub-topic 2

5.2.3Sub-topic 3

5.3 (Main topic 2)

5.4 (Main topic 3)

5.5 Summary

5.6 Answers to 'Check Your Progress' Questions

5.7 Unit end question

5.8 References

(Example of a IGNOU Unit Structure)

3) Writing the Unit:

There are three main parts of a unit —**Beginning of the Unit, Main body&Ending of the Unit.** Let us discuss each part, in brief.

Beginning of the Unit:

This part of the unit usually includes the following:

- a) *Unit Structure:* Every unit begins with the unit structure or the contents list. Being pedagogically more meaningful the expression ‘structure ‘is preferred than the contents list.
- b) *Introduction of the Unit:* The main purpose of introductory sections to introduce to the students what they will be studying in the unit. Like an effective classroom teacher, the introductory section of a unit provides necessary guidance to the student to facilitate his learning. There can be several ways of writing the introduction of a unit. There are generally three components of an introduction. *Structural component, Thematic component and Guidance component*
- c) *Objectives:* *Defining* objectives in terms of learning outcomes is useful for both the course writer and the students. Well defined objectives, in terms of learning outcomes, help in planning, developing, evaluating and revising any learning activity until the desired outcomes are achieved. There can be three domains of objectives: knowledge, affective, and psychomotor. Even within each domain the objectives can be set at lower or higher levels. The number and the level of the objectives should be according to the mental level of the students, and they should be achievable.

Main body of the Unit: This part of the unit includes the presentation of learning content/activities to be learnt by the learners. We should decide on how much of the materials/learning activities we would be including in the unit. It would be appealing if the content is aimed at achieving the objectives. It is always good if the content is divided into small but manageable learning steps or sections. Each section should present at least one new point, and exercises related to that/those points. These sections are further divided into subsections. Each section and subsection is given a suitable title and, wherever necessary, a serial

number. The title should be easy to recall or remember, and should communicate the essence of what is discussed thereof. The title should reflect on objectives.

The main body of a unit starts with content section and covers all sections and sub-sections of the content. Each section presents at least one main idea/point and sub-sections under that explain new points related to that, and self-assessment questions (SAQ)/check your progress (CYP) related to those points/idea. The objective of content presentation in section and sub-section is to provide the learning content in small chunks with as many self-evaluating opportunities embedded within the text. Usually each unit of a course (around 5000-6000 words) require approximately 6-8 hours of study. Chunking helps the learner to complete a unit in about 2/4 sittings of 2-3 study hours. The main body of the unit will have the following broad features.

Logical arrangement of learning points:

- a) *Logical arrangement of learning points:* The learning steps are logically arranged so that the learner proceeds from one learning step to another. And there should not be any abrupt gap or break between two steps. In other words, there should be a smooth transition from one learning point to another. The logical arrangement of content will ensure linkage between/among learning points. There can be linear and/or branching approaches to arrange learning events. In the unit structure also there should be a display of continuity and consistency of learning events.
- b) *Ordering of content:* The learning activities are arranged along the principles of teaching and learning. The principles of effective teaching proceed from the known to the unknown, from the simple to the complex, from the concrete to the abstract, from general to the particular, from actual to the representative, and so on, and are followed in writing a unit. Such an order of learning activities will have a logical flow and will create continuity of the desired focus.
- c) *Personalized style:* The course writer should be sympathetic and generous in discussing the content adequately. The content should be discussed in a conversational style and we should address the student directly in a friendly, informal tone. The student should feel as if he is listening or talking to the invisible distance teacher. Our discussion should establish an emotional link with students through varying styles of presentation of the content. Efforts should be made to link the content with the students' life experience keeping in view the need for variety and

change of pace to sustain the interest of students. At this point, you may recall the principles of self-instructional/learning materials such as self-directed, self-contained, self-explained, etc. that are to be maintained in presenting the content. Here, we should think of using more than one means of communication.

- d) *Language:* The quality of language is decisive factor in assuring the quality of SLMs. The language used should be warm, friendly and, above all, grammatically correct. Language should attract the students to read the text, involve them in the discourse and interact with the text. Personal pronouns such as ‘You’, ‘I’ and ‘We’ should be used frequently.
- e) *Illustrations:* Illustrations, diagrams, charts, examples, etc., form an important feature of SLMs. Illustrations creates interest in the students, stimulate their imagination, and increase their comprehension the knowledge. Illustrations make the abstract concepts concrete. Illustrations linked with real life experience will make the unit lively, impressive and interesting. There is no definite formula to decide the number of illustrations/diagrams in a unit. It depends on the nature and difficulty level of the concepts being taught / learnt.
- f) *Assessment:* Assessment helps in monitoring whether the student is moving towards the set objectives or not. Assessment also helps the students learn better and provides them feedback about their progress (self-assessment). Therefore, each step should be followed by an assessment item.

Ending of the unit: This is the last part of unit where the important learning points discussed in the main body of the unit are summarized, in brief. Summary helps learners recall the gist of the discussion and reinforce their learning. This part contains, besides summary, glossary, answers to self-check exercises/check your progress questions, and references and suggested readings.

Summary: The summary of the unit can be presented in variety of ways/forms. It can be in paragraphs, points, charts, tree diagrams, etc. The summary section should be comprehensive enough to provide properfeedback to the students.

Glossary: The crucial, key, new and technical words are better explained to the students to enhance their comprehension. The words with multiple meanings need to be defined with proper explanation. This leads to better understanding of the working definition of the terms.

Answers to self-check questions: The answers to the self-check questions, given in the text at the end of different sections/sub-sections, are provided at the end of the unit. These answers provide feedback to the students. These answers can be given in different ways, such as hints, full answers, model answers, etc., depending upon the type and nature of self-check questions. The answers should be clear and comprehensive.

SAQs/CYPs – Possible/Model Answers

The SAQs/CYPs play an important role in self-assessment and learning of the learners. The answers the learners write for SAQs/CYPs need to be checked with the possible/model answers, so that they can assess and observe their performance. This part of the unit plays the role of remedial learning, and it is important to provide feedback to explain why a student is correct or, incorrect in the response to SAQ. The possible/model answers need not tally with word to word. If both answers broadly match, that would be good enough for self-assessment. When the nature of SAQ is objective type, there is also a need to provide feedback for both correct and incorrect responses.

Unit-end Questions:

These are questions of such type which they may face in assignments/final examinations. The purpose of these questions is to make the students familiar with sample questions.

References and Suggested/Further Readings:

A list of references and suggested readings is presented to help those students who want to know more about the content of the particular unit(s) or topic(s). Further reading is a tool for helping extra learning by those students who are more inquisitive to learn more. There should be complete information about the book(s) such as author, year of publication, title, and publisher, place of publication, and relevant chapter / page.

Block-4

Unit-2

Approaches to e-learning in Education

4.2.1 E-LEARNING:

E-learning is defined as learning and teaching online through network technologies, is arguably one of the most powerful responses to the growing need for education. The use of electronic media and Information and Communication Technologies (ICT) in teaching and learning process (Naidu 2006) is referred to as e-learning, where “e” denotes “electronic”. It can also be described by many other terms including online learning, virtual learning, distributed learning, network and web based learning. E-learning includes all educational activities carried out by individuals/groups working online/offline and synchronously/asynchronously through network/standalone computers and electronic devices. E-learning is essentially imparting education through computer and network enabled digital technologies which include among other things, internet, intranet, computer, satellite, TV, CDROM, audio and video resources. Some of the popular collaboration tools of e-learning include Chat, forum, and wiki, online. E-learning could also be considered distance education in an evolved form, which has taken advantages of all the emerging technologies for enhancing learning experiences of every learner. In that sense e-learning could be considered as a new generation of distance education.

Definition and Concept of e- learning:

The term e-Learning implies diverse things to various individuals. Dublin (2003) and Oblinger and Hawkins (2005) assert that there is no definition acknowledged by all specialists. There are several definitions of e-learning which reflect different perspectives. There has been extensive debate about a common definition of the term e-learning. E-learning as a concept covers a range of applications, learning methods and processes (Rossi, 2009). It is therefore difficult to find a commonly accepted definition for the term e-learning,

Some important definitions have been given below:

According to Wentling et al (2000) the term e-learning refers to the attainment and use of knowledge that are predominantly facilitated and distributed by electronic means. To them, the e-learning depends on computers and networks, but it is likely it will progress into

systems comprising of a variety of channels such as wireless and satellite, and technologies such as cellular phones (Wentling et al., 2000).

Rosenberg (2001): “E-learning refers to the use of Internet technologies to deliver a broad array of solutions that enhance knowledge and performance.” Rosenberg claims that e-learning is based on three fundamental criteria: “E-learning is the delivery of education (all activities relevant to instructing, teaching, and learning) through various electronic media”.

The European Commission (2001) describes, e-Learning as the use of new multimedia technologies and the Internet to increase learning quality by easing access to facilities and services as well as distant exchanges and collaboration.

Liaw and Huang (2003) defined e-learning based on the summaries of its characteristics. In the **first place**, they propose a multimedia environment. **Secondly**, they incorporate several kinds of information. **Thirdly** e-learning systems support collaborative communication, whereby users have total control over their own situations of learning. In the **fourth place**, e-learning support networks for accessing information. **And fifth**, e-learning allows for the systems to be implemented freely on various kinds of computer operating systems.

Oblinger and Hawkins (2005) noted that e-Learning has transformed from a fully-online course to using technology to deliver part or all of a course independent of permanent time and place.

According to Maltz et al (2005), the term ‘e-learning’ is applied in different perspectives, including distributed learning, online-distance learning, as well as hybrid learning.

E-learning, according to OECD (2005) is defined as the use of information and communication technologies in diverse processes of education to support and enhance learning in institutions of higher education, and includes the usage of information and communication technology as a complement to traditional classrooms, online learning or mixing the two modes.

According to Tao et al (2006), this new environment for learning that is centered on electronic networks has allowed learners in universities to receive individualized support and also to have learning schedules that is more suitable to them as well as separate from other learners. This facilitates a high interaction and collaboration level between instructors or teachers and peers than traditional environment for learning.

Liaw et al, 2007: E-learning in academics which is characterized by the use of multimedia constructs made the process of learning more active, interesting and enjoyable.

In its broadest sense, Abbad et al (2009) defined E-- Learning to mean any learning that is enabled electronically. They however narrowed this definition down to mean learning that is empowered by the use of digital technologies. This definition is further narrowed by some researchers as any learning that is internet-enabled or web-based (LaRose et al, 1998; Keller and Cernerud, 2002).

Liu and Wang (2009) found that the features of e-learning process are chiefly centered on the internet; global sharing and learning resources; information broadcasts and knowledge flow by way of network courses, and lastly flexibility of learning as computer-generated environment for learning is created to overcome issues of distance and time (**Liu and Wang, 2009**)

It can therefore be concluded from the above that e-learning is an innovative technique or a form of information and communication technology. It is an instruction that is delivered electronically. It is carried out, supported and facilitated by the advanced multimedia facilities as well as Internet and web technology. It is used in providing learning experiences to the students on- line through the use of Internet services and web technology of the computers on the same lines. In essence, e-learning is a computer based educational tool or system that enables people to learn anytime and anywhere. e-learning can be defined as learning and teaching online through network technologies. It is one of the most powerful responses to the growing need for education. A study conducted by Harriman (2010) indicated different types of e-learning, namely, online learning, distance learning, blended learning, m-learning. These learning contents can be transferred via Internet, intranet, video/audio tapes, and CD-ROM, DVD, and TV channels. Actually today's application of technology to education and training is called "e-learning". It is a term that implies the use of the Internet as the centre. Therefore, e-learning can be broadly defined as use of Information and Communication Technology (ICT) to enhance and support learning. The most common Communication tools used in e-learning include, e-mail, Instant Messaging, Chat and Blogging.

Characteristics of E- learning:

- **Computer enhanced learning's-learning** is a generic term used to refer computer enhanced learning

- E-learning is carried out, facilitated or supported by Internet or web enabled technology like email, audio, video conference, mail list, live chats and telephony. Only web and internet based technology come under e-learning system.
- **E-learning is Learner-Centric Learning:** The learner centric e-learning model makes an array of resources available to the learner, who is free to choose when, where and how to learn.
- **E-learning is Flexible Learning:** E-learning has historically been linked with distance education and flexible learning. In distance education, various technologies can be used to link learners, instructors and resources that are removed in time or space.
- **E-learning Involves Learning Objects:** E-learning uses reusable learning objects. This RLO permits one to create e-learning course with ease.
- **E-learning Involves Effective Communication:** The effectiveness of e-learning also depends on establishing two-way communication between teachers and learners, and among learners themselves. There are many standalone tools as well as learner management system integrated tools to foster interactive and collaborative engagement.

Advantages of E-learning:

The adoption of E-learning in education, especially for higher educational institutions has several benefits. E-learning is considered among the best methods of education. According to Algahtani (2011), the likely benefits of e-learning are greater than the benefits of traditional learning if e-learning is used and applied in proper ways. The advantages of the adoption of e-learning in education are as follows:

- It is flexible when issues of time and place are taken into consideration. Every student has the luxury of choosing the place and time that suits him/her. According to Smedley (2010), the adoption of e-learning provides the institutions as well as their students or learners the much flexibility of time and place of delivery or receipt of according to learning information.
- E-learning enhances the efficacy of knowledge and qualifications via ease of access to a huge amount of information.
- It is able to provide opportunities for relations between learners by the use of discussion forums. Through this, e-learning helps eliminate barriers that have the

potential of hindering participation including the fear of talking to other learners. E-learning motivates students to interact with other, as well as exchange and respect different point of views. E-learning eases communication and also improves the relationships that sustain learning. Wagner et al (2008) note that e-Learning makes available extra prospects for interactivity between students and teachers during content delivery.

- E-learning is cost effective in the sense that there is no need for the students or learners to travel. It is also cost effective in the sense that it offers opportunities for learning for maximum number of learners with no need for many buildings.
- E-learning always takes into consideration the individual learners differences. Some learners, for instance prefer to concentrate on certain parts of the course, while other are prepared to review the entire course.
- E-learning helps compensate for scarcities of academic staff, including instructors or teachers as well as facilitators, lab technicians etc.
- The use of e-Learning allows self-pacing. For instance the asynchronous way permits each student to study at his or her own pace and speed whether slow or quick. It therefore increases satisfaction and decreases stress (Codone, 2001; Amer, 2007; Urdan and Weggen, 2000; Algahtani, 2011; Marc, 2002; Klein and Ware, 2003)
- The most vital characteristics as well as advantage of e-learning in education is that it centres on the students or learners (Holmes and Gardner, 2006).
- Sadler-Smith (2000) and Brown et al (2001) note that, the adoption and implementation of e- Learning provides disabled people the chance to further their education from any location.
- Hemsley (2002) have stated the opinion that full time and part time students can participate in their degree courses chosen from any place or location, offering people who are relocated or travel, an easily accessible resource for learning and experience (Hemsley, 2002).
- E-learning also aids in the preparation of the society to globally communicate and to dialogue with others (Zeitoun, 2008).
- According to Singh (2001), e-Learning systems enable improved communication between and among students and between students and faculty or instructors.

Disadvantages of E-learning:

E-learning, also has some disadvantages. The disadvantages of e-learning that have been given by studies include the following:

- E-learning as a method of education makes the learners undergo contemplation, remoteness, as well as lack of interaction or relation. It therefore requires a very strong inspiration as well as skills with to the management of time in order to reduce such effects.
- With respect to clarifications, offer of explanations, as well as interpretations, the e-learning method might be less effective than the traditional method of learning. The learning process is much easier with the use of the face to face encounter with the instructors or teachers.
- When it comes to improvement in communication skills of learners, e-learning as a method might have a negative effect on the learners. Though might have an excellent knowledge in academics, they may not possess the needed skills to deliver their acquired knowledge to others.
- Since tests for assessments in e-learning are possibly done with the use of proxy, it will be difficult, if not impossible to control or regulate bad activities like cheating.
- E-learning may also probably be misled to piracy and plagiarism, predisposed by inadequate selection skills, as well as the ease of copy and paste.
- E-learning may also deteriorate institutions' role socialization role and also the role of instructors as the directors of the process of education.
- Also not all fields or discipline can employ the e-learning technique in education. For instance the purely scientific fields that include practical cannot be properly studied through e-learning. Researchers have argued that e-learning is more appropriate in social science and humanities than the fields such as medical science and pharmacy, where there is the need to develop practical skills.
- E-learning may also lead to congestion or heavy use of some websites. This may bring about unanticipated costs both in time and money disadvantages (Collins et al. 1997; Klein and Ware, 2003; Hameed et al, 2008; Almosa, 2002; Akkoyuklu&Soylu, 2006; Lewis, 2000; Scott et al. 1999; Marc, 2002)

So it can be said that e-learning involves the use of digital tools for teaching and learning. It makes use of technological tools to enable learners study anytime and anywhere. It involves the training, delivery of knowledge and motivates students to interact with each other, as well as exchange and respect different points of views. It eases communication and

improves the relationships that sustain learning. Despite some challenges discussed, the literature has sought to explain the role of e- Learning in particular and how eLearning has made a strong impact in teaching and learning. Its adoption in some institutions has increased faculty and learner's access to information and has provided a rich environment for collaboration among students which have improved academic standards. The overall literature which explains the advantages and disadvantages of e-learning suggests the need for its implementation in higher education for faculty, administrators and students to enjoy the full benefits that come with its adoption and implementation.

Approaches to E-Learning

E-learning can be provided in many ways as given below:

- **Offline**
- **Online**
- **Synchronous**
- **Asynchronous**
- **Blended versus Fully online**
- **Mobile learning**

Some of these approaches are explained below:

4.2.2 OFFLINE LEARNING:

Offline learning refers to a traditional type of learning where learners or students are not exposed to digital learning but rather use face to face learning. Learning that occurs independent of the Internet and often involves traditional activities such as reading paper-based books, writing on paper, etc.

In the Big Indonesian Dictionary, the meaning of the word Luring (offline) comes from the acronym "outside the network", which means being disconnected from a computer network (offline).

Offline learning can be done by studying through books or in person meetings. The types of offline learning activities are the activity of watching news as a learning resource, students collect assignments in the form of documents, where offline learning does not take advantage of internet networks, computers, and other media. The initial learning method that allowed students to regularly interact in person with their peers and teachers, offline education is the conventional counterpart of online education. Offline learning is largely

unaffected by technical concerns and offers pupils a great chance to create and maintain a regular schedule.

Benefits of Online Learning:

- **Hands-on practice:** Typically, in online classrooms, students do not have the opportunity to engage in hands-on practise in several subject areas. Only in offline classes is it possible to comprehend a subject better.
- **Greater involvement and interaction:** In face-to-face learning, there is greater interaction between the students and the lecturers. They get to participate in more class activities.
- **Fewer distractions:** In offline classes, the professors only concentrate on teaching, therefore there are fewer distractions for the students while they are studying. They focus completely on the subject being covered in class.
- **Individual attention:** Teachers give each student their undivided attention, which helps students do better on exams. They gain a better comprehension of all the subjects and have more clarity regarding their doubts.

Drawbacks of Offline Learning:

- **Travel Expenditure:** The institutions for offline classes are all at the same place, and each student has to find a special way to get there. The additional travel and preparation time costs money and takes away from time that may be spent for independent study.
- **Rigid Schedules:** Because the timings are fixed, there is little room for flexibility with offline classes. Students who work 20 hours a week or full time have a higher dropout rate, while the cause of this is uncertain.
- **Expensive mode:** In addition to the cost of tuition, boarding, and travel expenses to campuses, offline study is an expensive form of learning, as we previously mentioned.
- **Offline mode lacks cutting-edge technology:** Learning about technology breakthroughs through online courses is highly recommended. By using laptops or computers and connecting with other students via a variety of channels, they are learning how to use technology and do it effectively.

4.2.3 ONLINE LEARNING:

An important change in the global school system was brought about by the Covid-19 pandemic. Lockdown regulations caused physical schools to close, which made online learning the new standard. Although it has helped to keep education alive in these challenging times, online learning cannot totally replace it.

Online learning is a method of education whereby students learn in a fully virtual environment. First introduced in the 1990s with the creation of the internet and utilized in distance learning, online learning (also called e-learning) is most prevalent in higher education, enabling students from different geographical areas to engage with an academic institution and other students online and learn flexibly, at their own pace, while working towards a degree or certificate.

Online learning refers to an internet-based learning environment that can connect students of diverse backgrounds who boast different perspectives. A higher education institution will use a learning management system, or LMS, to facilitate online learning, which can take the form of asynchronous learning (where students are not required to be online at the same time, and utilize discussion threads and e-mails to complete coursework) or synchronous learning (where students must be online at the same time).

According to Dabbagh and Bannan-Ritland (2005, p.15), Online learning is an open and distributed learning environment that uses pedagogical tools, enable by internet and web based technologies, to facilitate learning and knowledge building through meaningful action and interaction.

Online learning Hardware: Servers, Desktop clients, Laptop clients, Mobile Phones, Printers, Network (Wired and Wireless), Router, Firewall, WiFi Devices, Backup Storage, Video Conferencing System, LED Television, Projectors, Closed-Circuit Television, Video and Rally Cameras, Interactive Display, Visualizer-Documents Camera, Scanners, Audio Mixer Amplifier, Wireless Handheld microphone and Speakers.

Online learning software (Licensed and open sourced): Learning Management System (Moodle, MOOC, Coursera), Statistical Packages (SPSS, E-Views, R), Anti-Plagiarism Software, Industry Databases (CMIE-Prowess, Bloomberg), Video Interaction System (ZOOM, Google Meet, WebEx), Content Creation System (Microsoft Power Point, Adobe PDF, YouTube Edu), Chatting System (WhatsApp, WeChat, Slack), Website Management

System (PHP, WordPress, Drupal), Online Proctoring software and others.

Source: Veerasamy, &Goswami, 2022

Types of Online Learning:

Basically, online learning has two types, namely:

1. **Synchronous Learning:** Synchronous learning means “at the same time”. Synchronous learning is a type of learning in which the learning process occurs at the same time when the teacher is teaching and students are learning. This allows direct interaction between teachers and students, both via the internet and intranet. Synchronous online learning is mostly used by seminars or conferences with participants from several countries.
2. **Asynchronous Learning:** Asynchronous learning means “not at the same time”. So, one can learn at a different time than the teacher providing teaching. This learning is more popular in the world of e-learning because it provides more benefits for learners because they can able to learn anytime and anywhere.

Benefits of Online Learning:

- **Costs:** The first advantage is that online learning can reduce teaching and learning costs. This happens because online learning can be carried out without limits on the dimensions of the place and the time dimension so that the costs are not too large.
- **Time Flexibility:** Online learning allows employees or students to adjust their study time. They can insert a time after lunch, after the office is over and waiting for a pick-up, or when waiting for a colleague's report and there is no urgent work.
- **Flexibility of Place:** With online learning, students find it easy to carry out learning activities because they don't have to participate in learning activities at school so that they can save accommodation costs.
- **Learning Flexibility:** Online learning can be adjusted according to the learning speed of each student. Students set the pace of the lessons themselves.
- **Teaching Standardization:** Online learning can eliminate differences in the abilities and teaching methods applied by the teacher. Online learning lessons always have the same quality every time and it doesn't depend on the teacher's mood.

- **Effectiveness of Teaching:** Online learning which is designed with the latest instructional design makes students better understand the content of the lesson, online learning is a supporting factor to improve the quality of student learning.
- **Distribution Speed:** Online learning can reach students quickly to carry out teaching and learning activities which, this happens because of the rapid development of science and technology that can reach someone very quickly via the internet.
- **Flexible Environment and Schedule:** This discrepancy between online and offline schooling cannot be refuted by any fact. Students now have the power to design their own learning environment that best suits their needs thanks to the online learning environment.
- **Self-discipline:** During their independent study time at home, the students have acquired self-discipline. They are experts at effectively managing their time. They now know how to schedule their classwork, homework, classes, and other typical school activities. Parents say that their children have developed greater responsibility and time management skills.
- **Affordable:** Since online classes have taken hold, education has become somewhat more accessible. The price of uniforms, transportation, and extracurricular fees has significantly decreased, making education more accessible and inexpensive for both students and parents.

Drawbacks of Online Learning:

There are limitations to online learning, including:

- **Culture:** Some people feel uncomfortable taking computer training. The use of elearning demands a culture of self-learning, where a person motivates himself to want to learn. In contrast, in most training cultures in Indonesia, motivation to learn is more dependent on the teacher.
- **Investment:** Even though e-learning saves a lot of money, an organization still has to make a large initial investment to start implementing e-learning. Investments can be in the form of design and development costs for learning management system programs, lesson packages and other costs. If the infrastructure that is owned is not sufficient, the organization must spend a certain amount of money to buy computers, networks, servers, and so on.
- **Technical Issues:** A further drawback is that of technical issues. During online sessions, challenges with poor Internet access recur frequently. Urban and small-town communities

have the most trouble keeping a steady Internet connection. It obliterates the students' ability to learn.

- **Infrastructure:** The internet has not reached all areas of India. New broadband services exist in major cities. As a result, not all people or regions have not been able to experience e-learning with the internet.
- **Material:** Although e-learning offers a variety of functions, there are some materials that cannot be taught through e-learning.
- **Increased Screen Time:** Managing screen time is one of the biggest challenges that students who learn online must overcome. Online learning necessitates consistent extended periods of time spent logged in. Long-term screen time causes pupils a lot of trouble and is bad for their health overall, especially the eyes.
- **Other drawbacks include:** Individuals' sense of isolation; little peer assistance; and group work that is less effective than it would be if done offline.

4.2.4 SYNCHRONOUS E-LEARNING:

Synchronous e-learning involves online studies through chat and videoconferencing. This kind of learning tool is real-time. It is like a virtual classroom which allows students to ask, and teachers to answer questions instantly, through instant messaging, which is why it is called synchronous. This is commonly supported by media such as Video Conferencing, Virtual Classrooms and Chat sessions. The most familiar form of synchronous electronic communication is real time two way text-based online chat, which is widely used in e-learning. More sophisticated forms of synchronous instruction include virtual classrooms, which use information and communication technologies to mimic a traditional classroom environment.

4.2.5 ASYNCHRONOUS E-LEARNING:

On the other hand, Asynchronous learning can be carried out even while the student is offline. Asynchronous e-learning involves coursework delivered via web, email and message boards that are then posted on online forums. You can check your e-mail at your convenient time. Thus Asynchronous means you need not be online at the same time. This Asynchronous E-learning is commonly facilitated by media such as e-mail and discussion boards, supports work relations among learners and with teachers, even when participants cannot be online at the same time. Asynchronous instruction allows participants to control their own timetables and fit learning around their other commitments. Many of the technologies used in

asynchronous e-learning also permit two-way communication between learners and instructors, or multi-directional, collaborative communication among learners themselves.

Advantages & Disadvantages of synchronous and asynchronous Learning

	Advantages	Disadvantages
Synchronous Learning	<ul style="list-style-type: none"> • Discussion and collaboration in real time • Immediate feedback • Time and cost savings • Instructor assessment of learning via observation • Increased engagement and motivation via social presence 	<ul style="list-style-type: none"> • Requirement to participate in the same place at the same time • Can require advanced technical infrastructure and skill • Quality of engagement depends on facilitator skill • Learner self-pacing less available
Asynchronous	<ul style="list-style-type: none"> • Anytime, anywhere learning • Convenient access to course process and materials • Time for research and reflection before responding • Instructor assessment of learning via reflection and thoughtful response • Written expression more thorough and detailed 	<ul style="list-style-type: none"> • Potential for feelings of isolation, lack of connection • Self-pacing requires increased levels of self-direction • Quality of engagement depends on facilitator skill • No immediate access to instructor

Using Synchronous and Asynchronous Learning:

	Asynchronous	Synchronous
Why	<ul style="list-style-type: none"> • Students have more time to reflect because the sender does not expect 	<ul style="list-style-type: none"> • Students become more committed and

	an immediate answer	<ul style="list-style-type: none"> • motivated because a quick response is expected
How	<ul style="list-style-type: none"> • Use asynchronous means such as email, • discussion boards and blogs 	<ul style="list-style-type: none"> • Use synchronous means such as • videoconferencing, IM and chat, and • complement with face-to-face meetings
Example	<ul style="list-style-type: none"> • Student expected to reflect on a course topic and maintain blog journal • Students may critically assess their peers' ideas through a discussion forum 	<ul style="list-style-type: none"> • Students expected to work in groups may be advised to IM as support for getting to know one another • Instructor wants to present concepts from the literature in a simplified way by giving an online lecture using videoconferencing

Source: Hrastinski (2008)

4.2.6 BLENDED LEARNING:

Introduction:

Blended learning is an innovative concept that embraces the advantages of both traditional teaching in the classroom and ICT supported learning including both offline learning and online learning. Blended learning is the combination of different training “media” (technologies, activities, and types of events) to create an optimum training program for a specific audience. The term “blended” means that traditional instructor-led training is being supplemented with other electronic formats. Blended learning programs use many different forms of e-learning, perhaps complemented with instructor-led training and other live formats.

Definitions and Concept of Blended Learning:

The concept of Blended learning is rooted in the idea that learning is not just a onetime event - learning is a continuous process. Blending provides various benefits over using a single learning delivery medium alone – Singh (2003)

Blended learning should be viewed as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with technologically enhanced

active learning possibilities of the online environment rather than ratio modalities- Dziuban, Hartman and Moskal(2004)

The simplest definition of the term *blended learning* is the use of traditional classroom teaching methods together with the use of online learning for the same students studying the same content in the same course. It is a “thoughtful fusion of face-to-face and online learning experiences” (Garrison & Vaughan, 2008).

In other words, blended learning is a term applied to the practice of providing instruction and learning experiences through some combination of both face-to-face and technology-mediated learning. During the technology-mediated components of these learning experiences, students are not required to be physically together in one place but may be connected digitally through online communities. For example, one blended learning course could involve students attending a class taught by a teacher in a traditional classroom setting while also completing online components of the course independently, outside of the classroom, on an online learning platform.

Blended learning is sometimes called *hybrid* or *mixed-mode learning*. These systems of instructional design use many types of teaching and learning experiences and vary in design and implementation across teachers, programmes and schools. The potential variations of mixed-mode learning are virtually endless; a good way to get a sense of the range of possibilities is to consider some examples:

- In one school, a few teachers create mixed-mode delivery in their individual classrooms. In another, a whole programme chooses to make blended learning its choice of delivery for all students; all teachers work together to learn how to teach in a blended delivery system.
- Video recorded lectures, live video and other digitally enabled learning opportunities can be a student’s primary instructional interactions with other students and the teacher. In some cases, students may work independently on online lessons, projects and assignments at home or elsewhere, only periodically meeting with teachers to review their learning progress, discuss their work, ask questions or receive assistance with difficult concepts. In other cases, students may spend their entire day in a traditional school building, but they will spend more time working online and independently than they do receiving instruction from a teacher.

So, it can be said that Blended learning as an important and rapidly developing form of education. It emphasizes on the benefits it offers to both educators and students, including greater flexibility and convenience, as well as potential increases in learner creativity and independence. Blended learning can be defined as the combination of face-to-face classroom instruction with online learning within a course or programme — a definition broad enough to include a wide range of variations appropriate to the individual needs and contexts of a school or course. One key concept is that blended learning is not merely the addition of some technological element to an existing course but rather is an integrated plan utilizing the best of what both face-to-face and online learning have to offer. The blended presentation and interaction model, the blended block model and the fully online model provide initial frameworks for the deliberate structuring of blended learning to improve learning outcomes. In *blended programmes*, students study some courses in face-to-face classrooms and other courses are delivered fully online. Blended learning can be divided into three main models. These are **Blended presentation and interaction**, **Blended block** and fully **online**.

Three models of blended learning:

MODEL 1 Blended presentation and Interaction	MODEL 2 Blended block	MODEL 3 Fully online
Activity-focused face-to-face sessions blended with online resources. For example, the flipped curriculum model combines: <ul style="list-style-type: none"> • short lecture podcasts, online resources with • Face-to-face tutorial/seminars for interaction and presentation of group work. 	Combination of: <ul style="list-style-type: none"> • intensive face-to-face sessions as one day or half days • weekly online tutorial/seminars for activities and interaction • online content and resources 	Combination of: <ul style="list-style-type: none"> • short lecture podcasts with online resources and learning activities • online tutorials (synchronous) • interaction via online collaboration, discussion forums and/or group work

Source: Hannon & Macken (2014)

Benefits /Advantages of Blended Learning Approach:

Recent researchers have identified the following key benefits of blended learning:

- **Opportunity for collaboration at a distance:** Individual students work together virtually in an intellectual endeavour as a learning practice.
- **Increased flexibility:** Technology-enabled learning allows for learning anytime and anywhere, letting students learn without the barriers of time and location but with the possible support of in-person engagement.
- **Increased interaction:** Blended learning offers a platform to facilitate greater interactivity between students, as well as between students and teachers.
- **Enhanced learning:** Additional types of learning activities improve higher students' engagement and can help students achieve higher and more meaningful levels of learning.
- **Increases access to resources, experts and learning opportunities:** It provides exposure to a wide range of Web 2.0 technologies and acquisition of contemporary literacy skills
- **Learning to be virtual citizens:** It provides to the learners' greater opportunities for collaboration (especially beyond the classroom and involving the wider school community). Learners practice the ability to project themselves socially and academically in an online community of inquiry. Digital learning skills are becoming essential to be a lifelong learner, and blended courses help learners master the skills for using a variety of technologies. Thus, blended learning approaches enhance learning outcomes.

4.2.7 MOBILE LEARNING:

Introduction:

In the 21st century, technology has become a part of everyday life. In the present era Information and Communication technologies (ICT) have become one of the major factors for the development of the country. The use of ICT has brought changes in every aspect including business, travel, and education. The tremendous use of ICT devices in education has introduced a new form of learning called E-learning. The development of E-learning in education and training provides a way of new technologies in modern education and training systems. Mobile learning is one that comes under the umbrella term of E-learning.

Mobile learning which is also called M-learning has been defined differently by different author. Generally mobile learning refers to the learning that happens through the interaction with content in devices like mobile phones, tablets, personal digital assistants etc. O'Malley et al., (2003) defines mobile learning as “any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when learner takes advantage of the learning opportunities offered by mobile technologies.” Mobile learning provides educational contents and resources on personal pocket devices like smartphones, tablets, i- pads etc. Therefore, mobile learning can be defined as learning multiple contexts, through social and content resources, using personal electronic devices.

Mobile learning or M learning has made education easily accessible as well as it saves time and energy of the students. Basically, for the open and distance education mobile learning has a tremendous positive impact. Mobile phones are the most frequently used devices by the learners in these days. Through mobile learning students can learn easily from anywhere and anytime. Therefore, this new way of learning has a greater impact on student's learning. As mobile learning has a positive impact in education, there are some issues and challenges also in the use of mobile learning in education. Therefore, in the present study an attempt has been made by the researcher to discuss the advantages and challenges of mobile learning in education.

Mobile learning is the capability to attain or provide educational content on individual pocket devices such as PDAs, smartphones and mobile phones. Educational content in this context refers to digital learning resources accessible on any individual electronic device. Dikkers (2012) states “Mobile learning (M-Learning) is when the learning experience that you're trying to design happens to be out and about in the world”. Mobile learning allows flexible learning and is a mixture of Information and Communication Technologies (ICT) providing education anytime and anyplace. In mobile learning learners can use mobile devices to access educational resources, share with others, or produce content, both inside and outside classrooms. Mobile learning also takes care of administration of educational systems and helps in enhanced communication between institutions and families.

Ten parts in which mobile learning stands verifying its value as a learning delivery platform are as follows:

1. **Enlarge the reach of education** – spreading educational opportunities to those who do not have access to education, make groups of learners where they didn't exist earlier and

reaching more people than via traditional classroom-based training and learning.

2. **Promote adapted learning** – since mobile technologies are particularly portable and relatively economical, learning is much easier.
3. **Support learners with disabilities** – with the combination of text-enlargement, voice transcription, location-aware and text-to-speech tools, and mobile devices can significantly improve the knowledge of students who have physical disabilities.
4. **Delivery of instant response and assessment** - messages sent by mobile devices are fast, dependable, and less expensive than other communication channels, so students and teachers are progressively using them to simplify the exchange of information, restructuring valuations and providing learners and teachers with instant indicators of development.
5. **Permits anytime, anyplace learning** - since individuals carry mobile devices with them, learning can happen at anytime and anyplace that were not previously thought to be the preserve of 'education and learning'.
6. **Bridges official and casual learning** - using a mobile device, learners can access additional resources to simplify thoughts introduced in a classroom, ensuring that learning which happens inside and outside classrooms is equally helpful.
7. **Ensures classroom time is creative** - when students use mobile technology to complete learning tasks, such as attending a lecture or remembering information, they have extra time to discuss thoughts, share information, work collaboratively and contribute in various activities happening in a classroom. So, mobile learning can give learners better chances to enhance the complex skills.
8. **Supports situated learning** –learning is supplemented and supported with providing situations matching the theme of learning. For example, 'audio guides' placed at exhibition halls and art galleries, etc. that permit visitors to know information about specific articles or different art works while visiting such places.
9. **Increases seamless learning** – helps to obtain up-to-date information via cloud computing and cloud storage, regardless of the hardware learner's use to access that content. Since both learning materials and information about a learner's progress are stored on remote servers rather than on a single device's hard drive, students can access their learning material from a number of devices, as and when they need it. Moreover, because computing is increasingly moving to the cloud, devices don't necessarily need expensive processors to make use of sophisticated software. They merely need to provide learners connection to the internet

10. **Minimizes educational disruption in disaster areas** - mobile devices can help ensure the continuation of education during times of natural or man-made crisis, since mobiles are comparatively easy to repair.

Fundamentals of Mobile Learning:

Fundamentals of mobile learning include the following elements such as learner, educator, content, surroundings and valuation and are shown in Fig.1 below:

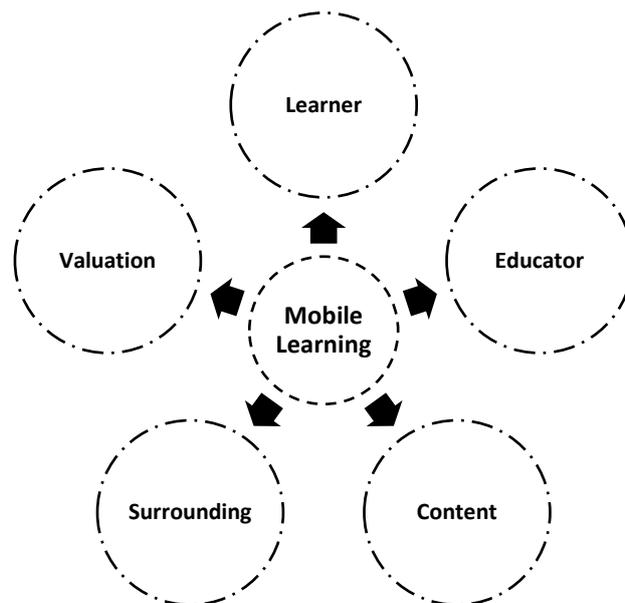


Figure: Fundamentals of Mobile Learning

Characteristics of Mobile Learning

Mobile learning has different characteristics. The chief characteristics of mobile learning are; spontaneous, transferable size of mobile tools, combined, private, communicating, collaborative and immediate information. The core characteristics of mobile learning enable learners to learn at any place and any time.

1. Ubiquitous/ Spontaneous: Mobile learning is more spontaneous than other types of learning. It is this spontaneity that is probably the most defining characteristic of mobile learning. Mobile learning is context aware, meaning that students can learn everywhere. Wireless technologies such as laptop computers, palmtop computers, and mobile phones are revolutionizing education and transforming the traditional classroom-based learning and teaching into anytime and anywhere education.

2. Portable size of mobile tools: Mobile learning tools are small and portable. Students can use it anywhere for their learning activities.

3. Blended: Teachers can use mobile learning as a blended learning approach. Students can use mobile tools for completing homework, projects, etc. Blended learning, which combines classroom instruction with m-learning, can maximize the benefits of both face-to-face and online method.

4. Private: M-learning is private. It means that only one learner at a time usually has access to the mobile tool and that when students want to access information they connect and download independently from other learners.

5. Interactive: M-learning environment utilize the latest technologies to create an interactive learning environment for learning. Students are not passive; the functions of mobile tools and learning environment allow students varying levels of interactivity. The technological layer represents learning as an engagement with technology, while tools such as computers and mobile phones function as interactive agent during the process of learning.

6. Collaborative: Mobile technologies support communication between students and teachers. So, mobile technologies may be used for collaborative learning activities during learning.

7. Instant information: Using a mobile tool is all about immediacy. According to Cohen (2010), “the need is for quick answers to specific questions”. Learning content must reflect the requirement by providing material that enables a learner to quickly zoom into information.

Role of Mobile Devices in Learning:

Mobile devices are very useful in learning. As mobile devices are cheaper than other ICT devices like laptop, computers; it can be used by every student in their learning. Following are some of the major role of mobile devices in learning-

- Through mobile phones learners can interact with each other and also with their teachers
- Students can use mobile phone in their learning in anywhere and anytime
- Through mobile phones students can easily share assignment, documents etc. with their friends as well with their teachers.

- Mobile devices can engage learners actively in learning
- It is much easier for learners to bring mobile phones in classroom rather than laptop, computer etc.

Advantage of Mobile Learning:

Mobile technologies can be of great help in the teaching learning process. Since mobiles are small, handy and user-friendly, those features can be utilized while designing mobile learning environment. The following are the advantages of mobile learning:

- Mobile devices help learners to access learning content anywhere and anytime
- Learners can learn while they are commuting and travelling and time is saved
- Mobile can store huge amount of information despite its size. Thus, the printing of learning materials can be reduced and pollution can be controlled.
- Mobile technology enables students to closely link with their peers, teachers, distant partners and even interest groups worldwide. This increases interactivity.
- Helps to enhance skills at one's own pace, with a degree of privacy that may be absent when using shared computer facilities.
- Good support for favoured modes of interaction.
- Catering for interests beyond what is provided in class, through accessing additional content such as podcasts or free learning materials.
- Opportunities for learners to give immediate feedback on their learning performance.
- Psychological support for those at risk of dropping out, through social networks or personal guidance from a mentor.
- Learning materials can become accessible to a larger audience, through podcasts, mobile applications, blogs and e-books, etc.
- Catering for disadvantaged social groups for whom mobile learning presents an opportunity to improve their learning.
- Turning geographically dispersed learners into a valuable teaching resource by enabling them to contribute their local knowledge and research data more easily.
- Support learner retention, progression and transition.
- One can access lessons, video clips and audio libraries from anywhere, including public places and moving buses and trains.
- Interaction with fellow students and instructors will be a great help. It is an accepted fact that learning is made easier when information is shared and questions answered

through a sort of combined study.

Summary

In this unit application of computer in education has been discussed. The concept, characteristics and their merits and de-merits of CAI, CAL, CML CBT has been discussed in this unit. The unit also includes the process of preparing SLM for distance learners. The meaning of e-learning and different strategies of e-learning has also been discussed in this unit.

ASSIGNMENTS:

- 1) Discuss the various forms of Computer in Education. State their application in Education.
- 2) Explain the term e-learning. State its merits and de-merits.
- 3) Discuss different strategies of e-learning.
- 4) Discuss the process of preparing ODLM for distance learners.
- 5) State the benefits of Mobile Learning.

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COR-313

EDUCATIONAL TECHNOLOGY

Block-5

E-learning and Emerging trends

CONTENT STRUCTURE

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Objectives

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Let Us Sum Up

Assignments

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INTRODUCTION:

In today's digital age, education has transcended traditional boundaries, and new opportunities for collaborative learning and open access to educational resources have emerged. In this unit, we will explore the concept of social learning and how it has been transformed by the emergence of web 2.0 tools.

We will discover the vast array of web-based platforms such as social networking sites, blogs, chats, video conferencing, and discussion forums that have revolutionized the way we learn and collaborate.

Furthermore, we will delve into the realm of Open Education Resources (OER) and its significant impact on education. Moreover, we will examine the concept of e-inclusion, and the assistive technology in e-learning. We will uncover how technological innovations have opened new avenues for individuals with disabilities, enabling them to access educational materials and participate fully in the learning process. So, let's embark on this enriching journey of exploration and discovery together.

OBJECTIVES:

After completing the unit, you would be able to

- ❖ Understand the concept of social learning and its significance in education.
- ❖ Explore the use of web 2.0 tools for collaborative learning.
- ❖ Define Open Education Resources and their significance in the education landscape.
- ❖ Explore the concept and principles of Creative Commons licensing for OER.
- ❖ Understand the concept and application of Massive Open Online Courses (MOOCs).
- ❖ Define the concept of e-Inclusion and its importance in promoting equitable access to digital technologies.
- ❖ Identify different types of assistive technologies used in e-learning.
- ❖ Explore the application of assistive technology for specific disabilities, such as visual impairments, hearing impairments, and learning disabilities.

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Unit-1

Basic Concept of Social learning

5.1.1: SOCIAL LEARNING:

Social learning refers to the process of acquiring knowledge, skills, attitudes, and behaviors through observation, imitation, and interaction with others. It involves learning from the experiences, behaviors, and expertise of individuals within social contexts, such as peers, teachers, mentors, and community members.

Social learning, as defined in psychology, refers to the process of learning through observation, imitation, and modeling of others' behaviors, attitudes, and emotional responses. It emphasizes the role of social interactions and the influence of the environment on individual learning and behavior.

Albert Bandura, a renowned psychologist, proposed the theory of social learning or social cognitive theory. According to Bandura, social learning occurs when individuals observe and imitate the behavior of others, particularly models whom they perceive as influential or credible.

In the context of education, social learning refers to the educational approach that recognizes the significance of social interactions, collaborative activities, and peer-to-peer learning in the learning process. It emphasizes the role of group discussions, cooperative projects, and shared experiences in enhancing learning outcomes. Social learning in education focuses on creating an interactive and participatory learning environment where learners engage with their peers, exchange ideas, and construct knowledge collectively. It acknowledges that learners can benefit from the diverse perspectives, experiences, and expertise of others, leading to a deeper understanding of concepts, increased motivation, and improved critical thinking and problem-solving skills. Social learning in education often incorporates the use of technology and web 2.0 tools to facilitate and enhance collaborative learning experiences.

5.1.2: IMPORTANCE OF SOCIAL LEARNING IN EDUCATION:

The importance of social learning in education cannot be overstated. Here are some key reasons why social learning is significant:

1. **Collaboration and Communication Skills:** Social learning provides opportunities for collaborative work, discussions, and group activities. Through interactions with peers, learners develop essential collaboration and communication skills, including active listening, expressing ideas, giving and receiving feedback, and working effectively in teams.

2. **Enhanced Learning Experience:** Social learning enhances the overall learning experience by promoting engagement, motivation, and active participation. When learners work together, they can share insights, clarify concepts, and learn from each other's strengths and weaknesses, resulting in a richer and more dynamic learning process.

3. **Constructing Meaning and Deepening Understanding:** By observing and interacting with others, learners can construct meaning and deepen their understanding of complex concepts. Through discussions, debates, and peer-to-peer explanations, learners can gain alternative perspectives and develop critical thinking skills.

4. **Skill Development:** Social learning provides a platform for learners to practice and refine a range of skills, such as problem-solving, decision-making, negotiation, and conflict resolution. Collaborative projects and group activities foster the development of these skills, which are essential for success in academic and professional settings.

5. **Emotional and Social Development:** Social learning fosters the development of emotional intelligence and social competence. Interacting with others helps learners develop empathy, self-awareness, and the ability to navigate social relationships effectively.

6. **Lifelong Learning and Professional Growth:** Social learning promotes a culture of continuous learning and supports lifelong learning habits. It encourages learners to seek and share knowledge, explore different perspectives, and stay updated with emerging trends and developments in their fields.

7. Preparation for Real-World Interactions: Social learning prepares learners for real-world interactions and collaborations. By engaging in social learning experiences, learners develop skills necessary for effective communication, teamwork, and professional relationships in their future careers.

So, social learning is crucial in education as it promotes collaboration, deepens understanding, enhances the learning experience, develops essential skills, nurtures emotional and social growth, and prepares learners for real-world interactions. By incorporating social learning approaches into educational practices, educators can create inclusive and engaging learning environments that empower students to become lifelong learners and active participants in their communities.

5.1.3: USE OF WEB 2.0 TOOLS FOR LEARNING:

Web 2.0 tools have revolutionized the way we learn and collaborate in the digital age. These tools provide interactive and participatory platforms that enable learners to actively engage in the learning process. Here are some key uses of web 2.0 tools for learning:

1. Social Networking Sites:

- Social networking sites like Facebook, LinkedIn, and Twitter offer opportunities for learners to connect with peers, experts, and communities of practice.
- Learners can join relevant groups, participate in discussions, and share resources, fostering collaboration and knowledge exchange.
- These platforms can be used for informal learning, professional networking, and staying updated with industry trends.

2. Blogs:

- Blogs serve as powerful tools for reflection, documentation, and sharing of knowledge and experiences.
- Learners can create their own blogs to articulate thoughts, discuss topics, and receive feedback from readers.
- Blogs can be used as digital portfolios, where learners showcase their work, reflect on their learning journey, and receive comments and suggestions from peers and mentors.

3. Chats and Instant Messaging:

- Chat tools and instant messaging platforms, such as Slack, Microsoft Teams, and WhatsApp, facilitate real-time communication and collaboration among learners.
- Learners can form study groups, discuss assignments, seek clarification, and provide peer support.
- These tools promote immediate feedback and foster a sense of community and connectedness, even in remote learning environments.

4. Video Conferencing:

- Video conferencing tools like Zoom, Google Meet, and Microsoft Teams enable synchronous communication and virtual meetings.
- Educators can deliver live lectures, facilitate discussions, and conduct interactive sessions with learners in real-time.
- Learners can actively participate, ask questions, and engage in group activities, fostering a sense of presence and interactivity.

5. Discussion Forums:

- Discussion forums, commonly found in learning management systems like Moodle and online communities like Reddit, provide asynchronous platforms for communication and knowledge sharing.
- Learners can engage in threaded discussions, ask questions, provide answers, and exchange ideas at their own pace.
- Discussion forums promote critical thinking, collaboration, and peer learning, as learners benefit from diverse perspectives and collective problem-solving.

6. Collaborative Document Editing:

- Tools like Google Docs, Microsoft 365, and Notion enable learners to collaborate on documents, presentations, and spreadsheets in real-time.
- Learners can work together on group projects, co-author reports, and provide feedback, enhancing collaboration and productivity.
- These tools also allow for version control, ensuring that all team members have access to the latest updates and edits.

Web 2.0 tools provide a rich learning environment where learners can connect, share, and co-create knowledge. By leveraging these tools effectively, educators and learners can enhance engagement, foster collaboration, and expand their learning networks beyond the confines of a traditional classroom.

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Unit-2

Open Education Resources

5.2: OPEN EDUCATION RESOURCES:

Open Education Resources (OER) refer to educational materials that are freely available for use, sharing, and modification by educators and learners worldwide. These resources are typically released under open licenses, such as Creative commons licenses, which allow for the legal and ethical sharing and adaptation of the materials.

5.2.1: CONCEPT OF CREATIVE COMMONS:

Creative Commons is a nonprofit organization that provides a set of licenses and tools to enable creators to share their works with the public while maintaining some rights and control over their creations. Creative commons licenses are used to designate the permissions and restrictions associated with a creative work, allowing creators to choose the level of openness and the conditions under which others can use, share, and build upon their work. Creative commons licenses are widely used in the context of Open Educational Resources (OER) to promote the sharing and accessibility of educational materials.

Following are some key elements of Creative Commons:

1. Licensing Flexibility: Creative commons licenses provide a range of options for creators to define how others can use their work. These licenses allow creators to grant permissions such as attribution, non-commercial use, modification, and sharing under specific conditions. By using Creative Commons licenses, creators can ensure that their works are accessible and can be freely used by educators, students, and the general public.

2. Openness and Collaboration: Creative Commons encourages the sharing and collaboration of educational resources, fostering a culture of openness and knowledge exchange. By licensing their works under Creative Commons, creators contribute to a global pool of openly accessible educational materials that can be freely used, adapted, and distributed.

3. Accessibility and Affordability: Creative Commons licenses help reduce barriers to education by making educational resources more accessible and affordable. Openly licensed resources can be accessed online without restrictions, eliminating the need for costly textbooks and allowing educators and learners from all backgrounds to benefit from high-quality educational materials.

4. Customization and Adaptation: Creative commons licenses enable educators to adapt and customize existing resources to suit their specific teaching needs. By allowing modifications under certain conditions, these licenses encourage the creation of derivative works, such as translations, remixes, and adaptations, fostering innovation and customization in educational content.

5.2.2: TYPES OF CREATIVE COMMONS LICENSES:

There are several types of licenses available under Creative Commons, each offering different permissions and restrictions. The following are the six main types of licenses provided by Creative Commons:

1. Attribution (CC BY): This license allows others to distribute, remix, tweak, and build upon the licensed work, even for commercial purposes, as long as they give credit to the original creator.

2. Attribution-ShareAlike (CC BY-SA): This license permits others to distribute, remix, tweak, and build upon the licensed work, even for commercial purposes, as long as they give credit to the original creator. Additionally, any derivative works must be licensed under the same or a compatible license.

3. Attribution-NoDerivs (CC BY-ND): This license allows others to redistribute the work, even for commercial purposes, as long as it is passed along unchanged and in whole, with credit to the original creator.

4. Attribution-NonCommercial (CC BY-NC): This license permits others to remix, tweak, and build upon the licensed work, but only for non-commercial purposes. Credit must be given to the original creator.

5. Attribution-NonCommercial-ShareAlike (CC BY-NC-SA): This license allows others to remix, tweak, and build upon the licensed work, but only for non-commercial purposes. Additionally, any derivative works must be licensed under the same or a compatible license, and credit must be given to the original creator.

6. Attribution-NonCommercial-NoDerivs (CC BY-NC-ND): This license is the most restrictive of the Creative Commons licenses. It allows others to download and share the work as long as they credit the original creator, but they cannot change it in any way or use it commercially.

These Creative Commons licenses provide a flexible framework for creators to share their work while retaining certain rights and allowing others to use and build upon their creations under specific conditions.

5.2.3: Applications of Creative Commons in the Open Educational Resource

Creative commons licenses have found numerous applications in the Open Educational Resource (OER). Here are some key applications of Creative Commons in OER:

1. Open Textbooks: Educators can use Creative commons licenses to openly license their textbooks, making them freely available to students and reducing the financial burden associated with traditional textbooks.

2. Lecture Materials and Slides: Educators can license their lecture materials, presentations, and slides under Creative Commons, allowing students to access and review course content outside of the classroom.

3. Online Courses and Learning Modules: Creative commons licenses enable educators to openly share their online courses and learning modules, providing learners with opportunities for self-paced, independent study.

4. Multimedia Resources: Creative Commons licenses facilitate the sharing of multimedia resources, including images, videos, and audio clips, which can be incorporated into educational presentations, projects, and assignments.

5. Collaborative Projects: Creative commons licenses encourage collaboration among educators and students by allowing them to contribute to and build upon each other's work, fostering a culture of shared knowledge and collective learning.

Overall, Creative commons licenses play a vital role in the Open Educational Resources movement by promoting the sharing, accessibility, and collaboration of educational materials, ultimately contributing to a more inclusive and equitable education system.

5.2.4: CONCEPT OF MASSIVE OPEN ONLINE COURSES (MOOCS):

Massive Open Online Courses (MOOCs) are a form of open educational resources (OER) that have gained popularity in recent years. MOOCs are online courses designed to be accessible to a large number of participants, typically at no cost or at a significantly reduced fee compared to traditional educational offerings. The courses are delivered through digital platforms, allowing learners from around the world to access educational content, engage in interactive activities, and participate in virtual discussions.

As open educational resources, MOOCs provide several key benefits:

1. Accessibility: MOOCs break down geographical barriers, allowing individuals from diverse backgrounds and locations to access high-quality educational content. This accessibility promotes lifelong learning and provides opportunities for individuals who may not have access to traditional educational institutions.

2. Flexibility: MOOCs offer flexibility in terms of time and location. Learners can access course materials and complete assignments at their own pace, fitting their studies around other commitments such as work or family responsibilities.

3. Variety of Subjects: MOOCs cover a wide range of subjects, including disciplines like computer science, humanities, business, and more. This variety allows learners to

explore diverse topics of interest and gain knowledge in areas that may not be readily available in their local educational institutions.

4. Interactive Learning: MOOCs often incorporate interactive elements such as quizzes, discussion forums, and peer-to-peer interactions. These features provide opportunities for collaborative learning, engagement with instructors and fellow learners, and the exchange of ideas and perspectives.

5. Cost-effectiveness: While some MOOCs may offer optional certificates or additional services for a fee, the basic course content is typically free. This makes MOOCs a cost-effective option for learners seeking to acquire new skills or knowledge without the financial burden associated with traditional educational programs.

6. Continuous Improvement: MOOC platforms often collect data on learner performance and engagement, enabling instructors and course designers to analyze and improve the learning experience. This iterative process helps enhance the quality and effectiveness of MOOCs over time.

It is worth noting that while MOOCs provide numerous advantages as open educational resources, they also come with certain challenges. These challenges include maintaining learner motivation and engagement, ensuring quality control across a diverse range of courses, and addressing the potential lack of personalized support and feedback due to the large-scale nature of MOOCs.

5.2.5: APPLICATIONS OF MASSIVE OPEN ONLINE COURSES (MOOCS):

MOOCs have gained popularity as a form of Open Educational Resource (OER) due to their potential to democratize education and provide access to high-quality learning materials. Here are some applications of MOOCs as an Open Educational Resource:

- 1. Accessible and Affordable Education:** MOOCs provide an opportunity for learners from diverse backgrounds and geographic locations to access educational resources and courses. As MOOCs are typically free or available at a reduced cost compared to traditional education, they help address barriers to education such as cost, location, and time constraints.
- 2. Lifelong Learning:** MOOCs cater to learners who are interested in acquiring new skills, updating their knowledge, or exploring new fields of study. As an OER, MOOCs offer self-paced learning opportunities, allowing individuals to engage in lifelong learning and professional development.
- 3. Flexible Learning Formats:** MOOCs often offer flexible learning formats, allowing learners to access course materials, lectures, and assignments at their convenience. This flexibility enables individuals to learn at their own pace and balance their education with other commitments.
- 4. Diverse Course Offerings:** MOOCs cover a wide range of subjects and disciplines, offering learners access to courses that may not be available locally or through traditional educational institutions. This broad selection of courses allows learners to explore diverse fields, gain interdisciplinary knowledge, and discover new areas of interest.
- 5. Interactive Learning Experiences:** MOOCs often incorporate interactive elements, such as quizzes, discussion forums, and peer-to-peer interactions, which enhance the learning experience. These features promote engagement, collaboration, and knowledge-sharing among learners, creating a dynamic online learning community.

6. Global Learning Communities: MOOCs attract a diverse group of learners from around the world, fostering cross-cultural and global learning communities. Learners can interact with individuals from different backgrounds, exchange ideas, and gain diverse perspectives, enriching the educational experience.

7. Certification and Skill Development: Many MOOCs offer certificates or badges upon completion, providing learners with tangible evidence of their acquired knowledge and skills. These certifications can be valuable for professional development, job advancement, or showcasing expertise in a particular subject area.

8. Blended Learning Integration: MOOCs can be integrated into blended learning approaches, where educators combine online learning with face-to-face instruction. Educators can leverage MOOCs as supplemental resources or as the foundation for flipped classroom models, combining online materials with in-person discussions and activities.

9. Educator Professional Development: MOOCs also serve as a resource for educators to enhance their teaching practices and explore new instructional methods. MOOCs designed specifically for educators provide opportunities for professional development, sharing best practices, and staying updated with the latest trends in education.

MOOCs as an Open Educational Resource have the potential to extend access to education, promote lifelong learning, foster global communities, and enhance the educational experience through their flexible and interactive nature.

Let us check our progress

1. What is social learning?

- a) Learning through social media platforms
- b) Learning in a group setting
- c) Learning through social interactions and collaboration
- d) Learning through online courses

2. Which of the following is a web 2.0 tool commonly used for social learning?

- a) Word processor
- b) Email
- c) Social networking site
- d) Calculator

3. Blogs are useful in social learning because they allow:

- a) Real-time video communication
- b) Document sharing
- c) Instant messaging
- d) Sharing thoughts and reflections

4. Which of the following web 2.0 tools allows synchronous communication and collaboration?

- a) Social networking sites
- b) Blogs
- c) Video conferencing
- d) Discussion forums

5. Discussion forums are effective for social learning because they:

- a) Facilitate real-time discussions
- b) Provide a platform for multimedia sharing
- c) Allow users to post and respond to questions and ideas
- d) Enable users to create and share presentations

6. Which web 2.0 tool is ideal for conducting virtual meetings or webinars?

- a) Social networking sites
- b) Blogs
- c) Video conferencing
- d) Discussion forums

7. Social networking sites, such as Facebook and LinkedIn, can be used for social learning by:

- a) Connecting with friends and family only
- b) Sharing personal photos and videos

c) Joining professional communities and engaging in knowledge sharing

d) Playing online games

8. How do web 2.0 tools enhance social learning?

a) By providing access to educational resources

b) By promoting collaboration and knowledge sharing

c) By offering self-paced learning modules

d) By facilitating one-way communication from experts to learn

Block-5

Unit-3

E-Inclusion

5.3: CONCEPT OF E-INCLUSION:

E-Inclusion refers to the concept of ensuring equal access and opportunities for all individuals in the digital world, particularly in the context of information and communication technologies (ICT). It focuses on bridging the digital divide and addressing the barriers that prevent certain groups from benefiting from the advantages offered by technology.

E-inclusion encompasses various aspects:

- 1) **Digital Access:** E-inclusion focuses on providing affordable and reliable access to digital infrastructure, such as internet connectivity, computers, smartphones, and other necessary devices. It aims to overcome geographical, economic, and infrastructural barriers to ensure everyone can connect to the digital world.
- 2) **Digital Skills:** E-inclusion emphasizes the need to equip individuals with the necessary digital literacy and skills to navigate and utilize digital technologies effectively. It promotes training programs and initiatives to enhance digital competencies and empower individuals to use digital tools for communication, learning, employment, and other aspects of life.
- 3) **Affordable Technology:** E-inclusion recognizes the importance of making digital technologies affordable and accessible to individuals from diverse socioeconomic backgrounds. It involves initiatives to lower the cost of devices, data plans, and software, ensuring that financial constraints do not hinder individuals' ability to access and utilize digital resources.
- 4) **Inclusive Design:** E-inclusion promotes the development of digital platforms, applications, and content that are accessible and usable by individuals with diverse abilities. It encourages inclusive design practices that consider the needs of people with disabilities, ensuring that digital experiences are barrier-free and inclusive for all.
- 5) **Social Inclusion:** E-inclusion goes beyond access to technology and focuses on leveraging digital tools to foster social inclusion. It aims to reduce social isolation,

strengthen community bonds, and facilitate participation in social, cultural, educational, and economic activities through digital platforms and services.

Overall, the concept of e-inclusion strives to create a digitally inclusive society where everyone can actively participate, benefit, and contribute to the digital age, irrespective of their background or abilities.

5.3.2: CONCEPT OF ASSISTIVE TECHNOLOGY:

Assistive technology refers to any device, tool, software, or equipment that is designed to assist individuals with disabilities in performing tasks, increasing independence, and improving their overall quality of life. It encompasses a wide range of technologies that can compensate for physical, sensory, cognitive, or communication limitations.

Assistive technology can be classified into various categories based on the specific disabilities they address. Here are some common types of assistive technology:

1. **Mobility Aids:** These include wheelchairs, walkers, canes, and crutches, which assist individuals with physical disabilities in improving their mobility and navigation.
2. **Hearing Aids:** Hearing aids amplify sound for individuals with hearing impairments, enabling them to better perceive and understand auditory information.
3. **Visual Aids:** These include screen magnifiers, braille displays, and optical character recognition (OCR) software that assist individuals with visual impairments in accessing and interpreting visual content.
4. **Communication Devices:** Augmentative and alternative communication (AAC) devices, text-to-speech software, and speech-generating devices help individuals with speech or communication impairments to express themselves and communicate effectively.
5. **Cognitive Assistive Technology:** These tools, such as memory aids, reminder systems, and cognitive apps, support individuals with cognitive impairments in enhancing their memory, organization, problem-solving, and other cognitive abilities.

6. **Environmental Control Systems:** These systems enable individuals with physical disabilities to control their environment, including lighting, temperature, appliances, and home automation, using assistive devices or voice commands.

7. **Prosthetics and Orthotics:** These devices, such as prosthetic limbs or braces, assist individuals with limb differences or musculoskeletal conditions in improving their mobility and functional capabilities.

8. **Assistive Software and Apps:** These include screen readers, speech recognition software, word prediction tools, and accessible educational software that provide support to individuals with various disabilities in accessing information, learning, and performing tasks on computers or mobile devices.

Assistive technology plays a crucial role in promoting inclusivity, independence, and equal opportunities for individuals with disabilities by addressing barriers and enabling participation in various aspects of life, including education, employment, communication, and daily activities.

5.3.3: APPLICATION OF ASSISTIVE TECHNOLOGY IN E LEARNING:

Assistive technology refers to any device, tool, software, or equipment that is designed to assist individuals with disabilities in performing tasks, increasing independence, and improving their overall quality of life. It encompasses a wide range of technologies that can compensate for physical, sensory, cognitive, or communication limitations.

Assistive technology can be classified into various categories based on the specific disabilities they address. Here are some common types of assistive technology:

1. **Mobility Aids:** These include wheelchairs, walkers, canes, and crutches, which assist individuals with physical disabilities in improving their mobility and navigation.

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3. **Visual Aids:** These include screen magnifiers, braille displays, and optical character recognition (OCR) software that assist individuals with visual impairments in accessing and interpreting visual content.

4. **Communication Devices:** Augmentative and alternative communication (AAC) devices, text-to-speech software, and speech-generating devices help individuals with

speech or communication impairments to express themselves and communicate effectively.

5. **Cognitive Assistive Technology:** These tools, such as memory aids, reminder systems, and cognitive apps, support individuals with cognitive impairments in enhancing their memory, organization, problem-solving, and other cognitive abilities.

6. **Environmental Control Systems:** These systems enable individuals with physical disabilities to control their environment, including lighting, temperature, appliances, and home automation, using assistive devices or voice commands.

7. **Prosthetics and Orthotics:** These devices, such as prosthetic limbs or braces, assist individuals with limb differences or musculoskeletal conditions in improving their mobility and functional capabilities.

8. **Assistive Software and Apps:** These include screen readers, speech recognition software, word prediction tools, and accessible educational software that provide support to individuals with various disabilities in accessing information, learning, and performing tasks on computers or mobile devices.

Assistive technology plays a crucial role in promoting inclusivity, independence, and equal opportunities for individuals with disabilities by addressing barriers and enabling participation in various aspects of life, including education, employment, communication, and daily activities.

LET US SUM UP:

This unit explored the concept of social learning, highlighting its importance in acquiring knowledge, skills, and behaviors through observation, imitation, and interaction with others. The role of social interactions and the influence of the environment in learning were emphasized. Web 2.0 tools, such as social networking sites, blogs, chats, video conferencing, discussion forums, and collaborative document editing, were identified as facilitators of social learning in e-learning, providing interactive platforms for learners to connect, collaborate, and co-create knowledge.

The unit also discussed the contributions of Creative Commons and Massive Open Online Courses (MOOCs) to the Open Educational Resources (OER) movement. Both Creative Commons licenses and MOOCs promote the sharing, accessibility, and collaboration of educational materials, thereby enhancing the accessibility and quality of education.

Furthermore, the unit highlighted the significance of assistive technology in e-learning. Assistive technology encompasses a range of devices, tools, software, and equipment

designed to assist individuals with disabilities, enabling them to perform tasks, increase independence, and improve their overall quality of life. In the context of e-learning, assistive technology plays a crucial role in ensuring equal access and opportunities for individuals with disabilities, enabling them to overcome barriers and actively engage in online learning.

ASSIGNMENTS:

1. What is social learning, and how does it differ from traditional learning approaches?
2. How can social learning enhance the educational experience?
3. What are some examples of web 2.0 tools that can be used for social learning?
4. How do social networking sites contribute to social learning in education?
5. In what ways can blogs be utilized for social learning?
6. How does video conferencing facilitate social learning in educational settings?
7. What is the role of discussion forums in promoting social learning?
8. What is the concept of Open Education Resources (OER)?
9. How do Creative commons licenses contribute to the sharing and accessibility of educational materials?
10. What are the different types of Creative commons licenses and their characteristics?
11. How can Creative Commons be applied to Open Educational Resources?
12. What is the concept of Massive Open Online Courses (MOOCs)?
13. What are some applications of MOOCs in the field of education?
14. What is the concept of E-Inclusion, and why is it important in the digital age?
15. What is assistive technology, and how does it assist individuals with disabilities?
16. How can assistive technology be applied in e-learning environments?
17. What are some examples of assistive technology devices or tools used in e-learning?
18. How does assistive technology promote inclusivity and equal access to education?
19. What are the benefits of incorporating assistive technology in e-learning platforms?
20. How can e-learning platforms ensure compatibility with various assistive technology tools?

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EDUCATIONAL TECHNOLOGY

Block-6

QUALITY OF E-LEARNING AND ETHICAL ISSUES

CONTENT STRUCTURE:

Introduction

Learning Objectives

6.1: Quality of e-Learning

6.1.1 Measuring quality of system: Information, System, Service, User Satisfaction and Net Benefits (D&M IS Success Model, 2003)

6.2: Ethical issues in e-learner

6.1.2 Ethical issues for e-learner and e-teacher- Teaching, Learning and Research

Let us sum up

Assignment

Suggested Reading

INTRODUCTION:

We know that the Education is a powerful weapon to change self, society and also the world. Hence quality in education is a very crucial issue. If we consider e-learning perspectives, quality is also a vital issue. Defining quality on education is a difficult matter but in this unit we will discuss some model to measure quality in e-learning.

Experts define e-learning in different ways. According to E-learning portal, 2009 “E-learning is the use of technology to deliver learning and training programs”. Koohang& Harman, 2005 defined e-learning as “E-learning is the delivery of education (all activities relevant to instructing, teaching, and learning) through various electronic media”. According to Ellis, Ginns& Piggott (2009), “E-learning is defined as information and communication technologies used to support students to improve their learning”.

Despite of its multi-faceted benefits many people view e-learning as inferior in quality in comparison to traditional classroom. One of the critics is the lack of personal contact causes low motivation of students. Some people claim that the lack of control causes the students’ delay of completion of task. Another criticism of e-learning is the possibilities for the academic fraud or dishonesty. Hence another concept evolves as ‘e-ethics’ or ethical issues for e-learner and e-teacher. We also discuss the e-ethics in this unit.

LEARNING OBJECTIVES:

After going through this unit, you will be able to

- Describe D&M isSucess models of 1992 and 2003
- Analyse and discuss different components of 2003 model
- Discuss different ethical issues in related to learning, teaching, and research
- Explain the meaning of plagiarism as an ethical issue

Block-6

Unit-1

Quality of e- Learning

6.1.1 MEASURING QUALITY OF SYSTEM: INFORMATION, SYSTEM, SERVICE, USER SATISFACTION AND NET BENEFITS (D&M IS SUCCESS MODEL, 2003):

The growth and advances of ICT has impacted almost every aspect of life. If we consider the education sector the impact is massive. Online learning, digital learning, e-Learning are the products of the evolution and application of ICT in the classroom. According to Benninck (2004), eLearning is the use of technology such as the internet, web applications and computing equipment to facilitate teaching and learning. E-learning reduces the long-term costs of learning and expands educational opportunities.

Information systems (IS) are considered as the systems that are used by organizations to store, filter, process, and utilize data. The effectiveness or success of any Information system depends on many factors like organizational, environmental and people use them. Therefore, many success models have been developed to assess the success of information systems, like- Technology acceptance model (TAM), DeLone and McLean (D&M success model), and The Gable et al. model. In this unit we will discuss D&M IS Success Model, 2003 only.

D&M IS SUCCESS MODEL (DELONE AND MCLEAN INFORMATION SYSTEMS SUCCESS MODEL):

E-learning is a platform that disseminates information and knowledge anytime and anywhere in the field of education and training. Implementation of Information systems vice versa e-learning are costly and need a substantial amount of time and effort. For that reason practitioners tries to identify the key factors affecting the success of e-learning systems. One of the popular models in this context is success model developed by DeLone and McLean (D&M). This model seeks to provide a comprehensive understanding of IS success by identifying and explaining the relationships among their most critical dimensions of success.

To measure the success of Information systems Delone and McLean reviewed the research published in period between 1981 to 1987. Based upon their research they identified six variables of its success- system quality, information quality, use, user satisfaction, individual impact and organizational impact. These are interdependent variables. D&M model states that the amount of system use can affect the degree of user satisfaction (DeLone and McLean, 1992). After the publication of D & M model, Seddon studied this model and modified the

variable use to Usefulness, Seddon also argued that this model is confusing because of the combination of process and variance in the same model. Researchers also suggested to include Service Quality construct also. Individual impact and organizational impact were replaced by Net Benefits

DeLone and McLean’s Information Systems Success (D&M IS) model was first formulated in the year 1992 to identify the factors responsible for information systems success. Initially six factors were identified. The model developed by DeLone and McLean in 1992 is given below:

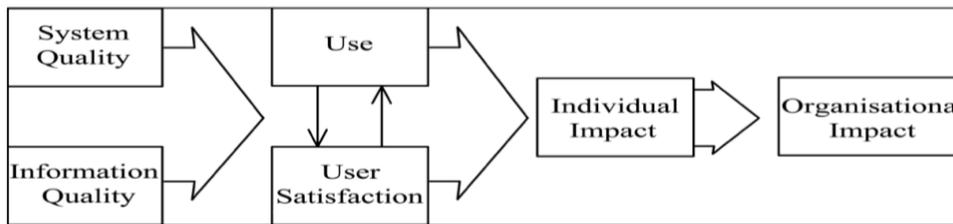


Figure 1. DeLone and McLean IS Success Model (DeLone & McLean, 1992)

In the above model the six variables are as follows:

- i. System Quality
- ii. Information Quality
- iii. Use
- iv. User satisfaction
- v. Individual impact
- vi. Organizational impact

DeLone and McLean revised their original model in the year 2003. In this model ‘Impact variables’ (individual and organizational) were grouped as ‘Net benefits’. The ‘use’ construct was subdivided into two aspects, ‘intention to use’ (attitude) and ‘actual use’ (resultant behavior). ‘Service quality’ was added as new variable to the model to consider the importance of service as a contributor to IS success. The revised D & M IS Success model is given below:

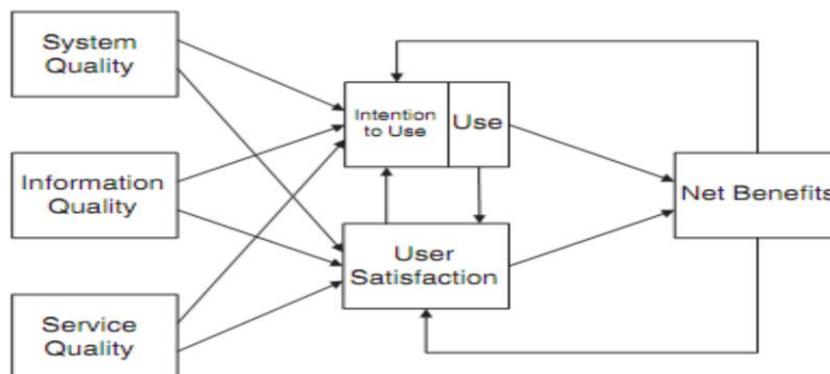


Figure 3: Updated DeLone and McLean IS success Model (2003)

Here we will discuss only D&M IS success model 2003. Now we describe the individual success variables: “System Quality,” “Information Quality,” “Service Quality,” “Use/Intension to use,” “User Satisfaction,” and “Net Benefits.”

- i. System quality: Desirable characteristics are as follows:
 - a. ease of use,
 - b. system flexibility,
 - c. system reliability, and
 - d. ease of learning,
- ii. Information quality: Desirable characteristics are as follows:
 - a. relevance,
 - b. understand ability,
 - c. accuracy,
 - d. conciseness,
 - e. completeness,
 - f. currency,
 - g. timeliness, and
 - h. usability
- iii. Service quality: Desirable quality of the support and support personnel are as follows:
 - a. responsiveness, reliability,
 - b. technical competence, and
 - c. empathy of the IT personnel staff
- iv. Use/Intension to use: the degree and manner in which employees and customers utilize the system. This can be measured by the following:
 - a. amount of use,
 - b. frequency of use,
 - c. nature of use,
 - d. appropriateness of use,
 - e. extent of use, and
 - f. purpose of use
- v. User satisfaction: User satisfaction is an individual’s perception of being satisfied with the system in comparison to his or her initial expectations of using the system.
- vi. Net benefits: This can be measured by the extent to which information systems are contributing to the success of individuals, groups, organizations etc. The desirable outcomes are as follows:
 - a. improved decision-making,

- b. improved productivity and profits,
- c. cost reductions,
- d. consumer welfare,

The D&M IS Success Model, 2003 provides us a valuable framework and guidelines for understanding different measuring factors of Information System. Hence this model can be used to evaluate an Information system in educational field.

Block-6

Unit-2

Ethical issues in e-learning

6.1.2 ETHICAL ISSUES FOR E-LEARNER AND E-TEACHER- TEACHING, LEARNING AND RESEARCH:

Ethics deals with values relating to human conduct. It focuses on the rightness and wrongness of actions of individuals. Ethics helps individuals to answering the questions ‘What should I do?’ and ‘Is it the right thing to do?’. Simply ethics refers to ‘what to be done to achieve what is good ’and ‘what ought not to be done to avoid what is evil’.

Ethics has a very important role in our lives. In education, ethics are important criteria which help to run the education system smoothly. In the field of education ethics has a great significance and recently different documents suggest that there should be some courses in higher education so that students can understand ethical issues. In education, there are broadly four principles of ethics, which are as follows:

- Honesty- means being trustworthy, loyal, truthful, sincere, fair etc.
- Confidentiality- means not disclosing or revealing one’s commitment to other unauthorized people.
- Conflict of interest- occurs when two or more contradictory interests relate to an activity.
- Responsibility- means the responsibility of students to teacher, students to students and also teachers to students to show proper respect and careful manners.

A shorter list on the code of ethics is suggested by Gearhart (2001):

- (i) Honesty, (ii) keeping your word, (iii) respect for others, and (iv) fairness

R. A. Fass, in a study for the American Council on Education, identified early patterns of inappropriate behavior in eLearning, which includes:

- Inappropriate assistance on examinations
- Misuse of sources on papers and projects
- Writing assistance and other inappropriate tutoring
- Misrepresentation in the collection and reporting of data
- Improper use of academic resources
- Disrespecting the work of others
- Lack of adherence to copyright and copy-protection

- Providing inappropriate assistance to others
- Lack of adherence to academic regulations

PLAGIARISM- ETHICAL ISSUES IN RESEARCH:

Plagiarism is presenting someone else's work, including the work of other students, as one's own. According to the Merriam-Webster OnLine Dictionary, to “plagiarize” means

- 1) To steal and pass off (the ideas or words of another) as one's own
- 2) To use (another's production) without crediting the source
- 3) To commit literary theft
- 4) To present as new and original an idea or product derived from an existing source.

There are different types of plagiarism. Some of them are as follows:

- Word for Word Plagiarism: Copying a source’s text exactly the way it is written.
- Paraphrasing: Condensing the work of another in your own words without citing.
- Copy & Paste Plagiarism: Copying and pasting text from an electronic source and using it as your own.
- Word Switch Plagiarism: Taking a sentence from a source and only switching around a few words.

There are also some other plagiarism like- Style Plagiarism, Metaphor Plagiarism, Idea Plagiarism, Self-Plagiarism.

In the field of digital and e-learning, plagiarism is an important ethical issue and now this issue is appropriately addressed by UGC and also other authorities.

LET US SUM UP:

Firstly, in this unit we discussed the D&M IS Success model of 1992 & 2003. These models are helpful to measure the effectiveness of Information System success. Secondly, we discussed different ethical issues in e-learning especially in learning, teaching and research

ASSIGNMENT:

1. What is an online repository? Mention the types of online repository.
2. Give concept of online library. Discuss the features of online library. Mention the functions of online library.

3. Mention the types of online survey tool.

4. Discuss the advantages of online survey tool.

SUGGESTED READINGS:

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EDUCATIONAL TECHNOLOGY

Block-7

Use of ICT in Evaluation, Administration and Research

CONTENT STRUCTURE:

Introduction

Learning Objectives

7.1 Use of ICT & Research

7.1.1 Development of CRT

7.1.2 e- portfolios

7.2 ICT for Research & Assessment of tools

7.2.1 Online repositories and online libraries

7.2.2 Online assessment tools

Let us sum up

Assignment

Suggested Reading

INTRODUCTION:

ICT is the short form of three basic terms—Information, Communication and Technology. The term Information and Communication Technology (ICT) includes various forms of technologies that are used to create, display, store, process, transmit, share or exchange information by electronic means (UNESCO 2007).

ICT is helpful in education in different ways. Some of them are given below:

- ICT helps to access data instantly
- ICT helps of organize and store data.
- ICT provides great opportunities to learn.
- ICT helps in learning, teaching, and assessment.
- ICT helps to conduct research in a systematic way.

In this unit we will discuss the development of CRT, meaning and applications of e-portfolios, use of ICT in online repositories and online libraries, and offline and online tools for assessment.

LEARNING OBJECTIVES:

After going through this unit, you will be able to

- ❖ Explain the meaning and nature of CRT
- ❖ Describe the steps of CRT construction
- ❖ Discuss the meaning, types, and importance of e-portfolio
- ❖ Explain the meaning of online repositories and online library
- ❖ Discuss the features, types, and advantages online repository and library

Block-7

Unit-1

Use of ICT & Research

7.1: DEVELOPMENT OF CRT:

Before discussing the development of CRT, we will discuss the meaning, nature and importance of CRT.

Meaning and nature of CRT: There are two ways of interpreting learner's performance. One is NRT (Norm referenced test) and other is CRT (Criterion referenced test). CRT (Criterion referenced test) compares a student's performance to a set of criteria or standards. These criteria or standards are established before the test and which are well defined, specified and acceptable in terms of instructional learning outcome or desired standard of performance. Here we cite some definitions of CRT-

Glaser and Nitko: one that is deliberately constructed so as to yield performance that is directly interpretable in terms of specified performance standards.

Popham: A criterion-referenced measure is used to ascertain an individual's status in a defined assessment domain.

Gronlund: "Criterion-referenced-test is a test designed to provide a measure of performance that is interpretable in term of a clearly defined and delimited domain of learner's tasks."

Hambleton: "A criterion referenced test is constructed to assess the performance level of examinee in relation to a set of well-defined objectives".

Steps of Development/Construction of CRT:

Different experts mentioned different steps for CRT construction. Hambleton suggested 12 steps of constructing CRT. Here we will discuss 14 steps for developing CRT. If we consider the steps, it is found that basically there are three phases of development of CRT:

- Preparation or Planning phase- deals with preliminary consideration of CRT
- Construction or Development phase- deals with framing the test and scoring procedure
- Evaluation or Standardization phase- deals with the process of standardization of test

Now we will discuss the steps in details:

1. Preliminary Considerations in Preparing a Test:

In this step the test developer considers the following points:

- Purpose of the Test
- Group or students which will be assessed
- Content area(s)
- Test Length, availability of time etc.
- Timeline for Test Development

2. Identification of Possible Content for Inclusion in a Test:

The second step in CRT development is to take decision about the subject matter area to be assessed or worked out. For example, one may take up Mathematics or English and consider a specific content area(s) from this subject.

3. Preparation of Domain Specifications:

In this step test developer prepares the domain specifications of the selected content area. Each validated objective must be included at least one domain specification.

4. Review of Domain Specification:

The tasks identified in step 3 should be reviewed by an external expert, who is not involved in identifying the domain and its descriptions in terms of the content elements and the specific objectives.

5. Additional Test Planning:

Here test developer considers the feasibility of including all the domain specifications as considered in previous steps.

6. Preparation of the 'test content':

Here test developer prepares the draft set of test items and also directions for test administration.

7. Preparation of a scoring method:

At this stage, test developer prepares scoring norms or marking scheme for the test items as constructed in step 6.

8. Test materials review:

Here external specialists review the test content, direction, and scoring method. Then test constructor will make necessary revisions. Then test developer applies the test to a small group for try out and makes necessary revisions on the basis try out application.

9. Compilation of the final form:

Now the test developer finalizes the test with direction and scoring method and finally compiles the final draft.

10. Determination of standards:

In this step external experts will decide the reliability and validity of the test by taking some numerical or logical data.

11. Preparation of report forms:

Here a report is prepared to review the final form of test and test developer takes necessary corrections after getting the report form from the experts.

12. Preparation of Technical Manual:

Here test developer administers the test and test the reliability, validity of the test once again. Test developer also prepares the test norm after administering the test.

13. Publication of the Test:

Here test developer prepares the final test manual including test content, directions, scoring method, technical data. This is the final version of the test.

14. Collection of Technical Data:

Her test developer collects the data periodically and verifies different criteria of the test.

7.1.2: E-PORTFOLIOS:

Before discussing the concept, we will discuss first the meaning of 'portfolio'. Paulson, Paulson and Mayer define that portfolio is 'a purposeful collections of student's work that exhibits the student's efforts, progress and achievement in one or more areas'. Gracedefines it as "portfolio is a record of the child's process of learning: what the child has learned and how she has gone about learning; how she thinks, questions, analyzes, synthesizes, produces, creates; and how she interacts--intellectually, emotionally and socially-with others". Collins identify portfolio as "a container of collected evidence with a purpose. Evidence is documentations that can be used one person or group of persons to infer another person's knowledge, skill, and/or disposition".

Now if we consider the meaning of e-portfolio, it is an evolving electronic/online resource that used to record, store and archive the artefacts of learning and reflection for an individual learner. e-portfolio is also known as a digital portfolio, online portfolio, e-portfolio, e-folio. The American Association of Colleges and Universities describes e-Portfolios (also known as digital portfolios) as digital repositories of student work.

Types of e-portfolio:

There are three types of portfolio. They are as follows:

i) Developmental Portfolio: This demonstrates the growth and advancement of the students across the learning period. This type of portfolio collects and records student's works that are on progress (or working). They are like ongoing portfolios. For example, the work of students during home assignment, project report, etc., can be collected and used to assess students.

ii) Assessment Portfolio: This demonstrates the students' competencies and skills for well-defined areas. These are for end-of-course or term-end evaluation of student's performance. For example, semester-end exams, lab reports, etc. can be accumulated in portfolio.

iii) Showcase Portfolio: This demonstrates exemplary work of students in any specific area. For example, students who are proficient in literature can accumulate their literary works in showcase portfolio. Similarly, students who are good in drawing can showcase their art works.

There are some others types of portfolio as mentioned by different experts. Process portfolio, Product portfolio, Course portfolio, Teacher portfolio, Career portfolio, Personal portfolio, etc.

TOOLS FOR CREATING E-PORTFOLIO:

There are various tools (apps). Some of them are as follows:

- (i) Mahara: Mahara is a fully featured open source web application used to build e-Portfolio.
- (ii) Weebly: Is an application to create website and digital portfolio. The user-friendly nature of Weebly allows students to create websites using customized templates and then add digital documents.
- (iii) Word Press: Is an application to create website and digital portfolio. The Word Press has various features and uploads files of different formats.
- (iv) iWebfolio: iWebfolio is an advanced e-Portfolio management system that helps individuals organize and archive work materials such as text documents, presentations, graphics files, sound clips, video files, etc.
- (v) Google Sites: Is a free platform to build website and digital portfolio.
- (vi) Moofolio: Moofolio is a Moodle block developed by Seacoast Professional Development Center, for the students and teachers to create portfolio.

Advantages of e-portfolio:

- It helps to organize the data through electronic media.
- It helps to store the information quickly, and easily.
- It is easy to handle and carry for the individual.
- E-portfolio has been used to facilitate, document, and archive student learning.
- Students can select their representative work and reflect on what they learned, hence they are sensible to their educational experiences and derive new meaning out of the process.
- It can also function as a tool for faculty to monitor and evaluate program effectiveness.
- It can serve as a tool for planning future development.

Block-7

Unit-2

ICT for Research & Assessment of tools

7.2: ICT FOR RESEARCH:

ICT has a wide range of application from classroom to research. In research ICT can be used in the following two ways:

7.2.1: ONLINE REPOSITORIES AND ONLINE LIBRARIES:

Both the terms connote the storage of information in the form of electronic version. According to some experts online repository is a broader term than online library.

Online Repository: It commonly refers to a location for storage, often for safety or preservation. A repository especially in academic field is a real or virtual facility for the deposit of academic publications. Online or digital repositories are systems that enable us to store data in the form of electronic data or materials, like- still image galleries, manuscripts, anything that is in electronic format and needs a place to be stored either in the short or longer term.

Types of online repository:

- 1. Subject repository:** A repository established to collect and preserve material in a particular subject is called a subject repository. The two known examples of this category are **arXiv**, for mathematics and physics articles or reports. and **PubMed** for biomedical journal articles.
- 2. Departmental repository:** A repository established for the use of a particular academic department is properly called a departmental repository or institutional repository. An example is the Repository for the School of Electronics and Computer Science at the University of Southampton, UK (URL: <http://eprints.ecs.soton.ac.uk/>)
- 3. National repository:** A repository for general use in a particular country is called a national repository. In the UK, the British Library operates a national repository (URL: <http://www.bl.uk>) and in India NDL (National Digital Library) are the examples of this category.
- 4. Thesis/Newspaper repository:** A repository can also be intended for a particular type of material, such as a thesis repository or a newspaper repository.

Characteristics of Digital repository:

- Content is deposited in a digital repository.

- Online repository manages content as well as metadata.
- Online repository offers a minimum set of basic services e.g. put, get, and search. access control.
- The repository must be sustainable and trusted, well-supported and well-managed.
- Many, though by no means all repositories support ‘open access’ at least in part.

Functions:

Repositories perform the following main functions:

- Provides wider access and visibility to the research output
- Fosters communication
- Increases the citation to the publications
- Share unpublished ideas and knowledge

Online Library:

Digital library, also called an online library, an internet library, a library without walls. It is a digital collection in an online database of digital objects, like- text, still images, audio, video, documents, or other digital media formats which are accessible through the internet.

Digital libraries can vary immensely in size and scope, and can be maintained by individuals or organizations. The digital content may be stored locally, or accessed remotely via computer networks.

According to Smith "Digital libraries are 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 service that is supported by digital technology".

Characteristics of Online Library-

- **No physical boundary:** The user of a digital library need not to go to the library physically; people from all over the world can gain access to the same information.
- **Round the clock availability:** A major advantage of digital libraries is that people can gain access 24/7.
- **Multiple accesses:** The same resources can be used simultaneously by a number of individuals or institutions.
- **Information retrieval:** Digital libraries can provide very user-friendly interfaces, giving click able access to its resources.

- **Space:**Digital libraries have the potential to store much more information, simply because digital information requires very little physical space and media storage technologies are more affordable than ever before.

Function of Online Library:

- Access to large amounts of information to users wherever they are and whenever they need it.
- Support multimedia content along with text
- User-friendly interface
- Integration with other digital libraries.

7.2.2: ONLINE SURVEY TOOLS:

Online survey tools provide the ability to create, run and interpret various types of surveys either on the user's websites, on emails, or hosted web pages. Online survey-based studies collect information from participants using internet-based communication technology (e.g. E-mail, online survey platform). There has been a growing interest among researchers in using internet-based data collection methods especially during and after the COVID-19 pandemic.

Types of online survey tools:

Nayak, S. D & Narayan, K. A. (2019) discussed 3 types of online survey tools, these are:

1. **Computer-Administered Surveys:** Computer-administered surveys are the first use of computers to collect survey data. In this a written program is administered to collect the answers in one of several ways: 1) by gathering respondents to a central location to answer the questions at the computer; 2) the survey installed on the organization's network; or 3) the program saved on a disk for respondents to answer and then return the disk. The computer-administered survey shows comparable results to the traditional paper and pencil survey. However, electronic surveys were less socially desirable.
2. **Electronic Mail Surveys:** After email becoming ubiquitous, electronic mail surveys became very popular. The survey is sent to a person's email address. The respondents could answer the questions and mail back the responses to the researcher or print the questionnaire and fax the responses. Both sending and responding is very simplified and cost-effective. The disadvantage is that data entry is still required and the compatibility of software.
3. **The web survey:** This is the most popular type online tools for survey. Google Forms is one of the most suitable examples in this category for sending out a short questionnaire, charting the results, or exporting them for analysis to a spreadsheet. This type of web survey provides for various question formats from text boxes,

paragraph texts, multiple choice, checkboxes, scale, grid, etc. Some of examples are Survey Sparrow, Qualtrics, Survey Monkey, QuestionPro, Survey Legend, Zoho Survey, Google Forms.

Merits of Online survey tools:

Nayak, S. D & Narayan, K. A. (2019), Singh, S. & Sagar, R. (2021) discussed the merits of online tools in their research papers-

1. **Faster:** The period needed to complete surveys online is on average two-thirds shorter than that of traditional research methods because information is being gathered automatically.
2. **Cheaper:** Using online questionnaires reduce the research costs. Responses are processed automatically and the results are accessible at any time.
3. **More accurate:** As the respondents enter their responses directly into the system the margin of error is greatly reduced with online surveys.
4. **Quick to analyze:** The results of the online survey are ready to use. Researcher can create graphs, export data for further analysis, and share the results.
5. **Easy to use for participants:** Many people that have access to the Internet prefer to answer surveys online instead of using hardcopy. Here participants can choose a situation that suits them best.
6. **Easy to use for researchers:** It increases productivity of the researcher by saving time. Data is instantly available and can easily be transferred into specialized statistical software or spreadsheets when more detailed analysis may be used.
7. **More flexible:** The order of the test items in an online survey can be changed or skipped altogether.

ASSIGNMENTS:

1. Explain meaning and nature of CRT
2. Mention the steps of Construction of CRT
3. Give concept of e-portfolio. Write the types of e-portfolio.
4. Discuss the tools for creating e-portfolio.
5. Mention the advantages of e-portfolio.

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