POST-GRADUATE DEGREE PROGRAMME (CBCS)

M.A. in EDUCATION

SEMESTER-IV

EDE-418 (AET)

ADVANCED EDUCATIONAL TECHNOLOGY

ELECTIVE PAPER

Self-Learning Material

DIRECTORATE OF OPEN AND DISTANCE LEARNING
UNIVERSITY OF KALYANI
KALYANI-741235, WEST BENGAL

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April, 2024

Directorate of Open and Distance Learning, University of Kalyani

Published by the Directorate of Open and Distance Learning, University of Kalyani, Kalyani-741235, West Bengal

Printed by East India Photo Composing Centre, 209A, Bidhan Sarani, Kolkata-700006

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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 three fold 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 Regulations, 2020 had been our endeavor. 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 with in 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 wouldespecially 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 coordinated 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.

All the Self-Learning Materials are self writing and collected from e-book, journals and websites.

Director
Directorate of Open and Distance Learning
University of Kalyani

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SYLLABUS
Full Marks-100

SEMESTER – IV

EDE-418 (AET): ADVANCED EDUCATIONAL TECHNOLOGY

Block	Contents	Study hour
Block-1 Conceptual orientation of Educational Technology	**Unit – 1 : Genesis and Psychological Foundation of ET** 1.1.1: Introduction 1.1.2: Objectives 1.1.3: Genesis of ET 1.1.4: Psychological Foundation of ET	1 Hour
	Unit – 2: Cybernetics and Application of ET in Indian classroom situation 1.2.1: Cybernetics (Systems Approach)- origin, characteristics, and stages, 1.2.2: Application of ET in Indian classroom situation 1.2.3: Let us Sum up 1.2.4: Assignment 1.2.5: Suggested Readings	1 Hour
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EDE - 418

ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK- 1

Conceptual orientation of Educational Technology

Unit-1

Genesis and Psychological Foundation of ET

CONTENT STRUCTURE

1.1.1: Introduction

Educational technology (ET) refers to the systematic application of scientific knowledge to facilitate teaching, learning, and related factors. It considers a wide range of tools, techniques, resources, and methodologies for enhancing educational outcomes of learners. The nature of Educational Technology is multifaceted. Educational Technology is interdisciplinary in nature. One of the central focus of Educational Technology is pedagogy. ET is dynamic and evolving continuously driven by ongoing research in information and communication technology. Different emerging trends in ET field are virtual learning, augmented reality, gamification, artificial intelligence etc.

In this block we will discuss the genesis of ET, psychological foundation of ET. The origin, meaning and nature of Cybernetics and its application in education. At the end of this block, application of ET in Indian context will be discussed.

1.1.2: Objectives

After completing the block the learner will be able to:

- Discuss the evolution of ET
- Explain the meaning, nature and steps of Cybernetics
- State the meaning of Systems approach in the context of cybernetics
- Elaborate the application of ET in the classroom of Indian context

1.1.3: Genesis of ET

Genesis of ET in the light of Psychological foundation: If we consider the psychological perspectives of ET, we see that ET has been guided by different psychological viewpoints. Considering this perspective, we may classify the evolution of ET as:

- **Educational Technology-I:** This part has been based on Behaviourist learning theories. At this stage, Programmed Instruction, Drill & Practice software programme had been used to reinforce rote memorization and some basic skills.
- **Educational Technology-II:** The focus of this phase shifted towards Cognitive learning theories. This stage embraced cognitive constructivist as proposed by Piaget, Bruner etc. ET expanded to use multimedia and hypermedia to create interactive learning experiences.

- **Educational Technology-III:** This stage is last and final stage till date. Here focus shifted towards Social constructivism, Personalized learning strategies, Ubiquitous learning environment. Modern approaches of technology are included in this stage, like- Virtual reality, Augmented reality, Artificial intelligence etc.

Genesis on the basis of technological inventions:

- **Pre-20th Century:**
    - Oral system: Before written language, education primarily transmitted on oral system through storytelling, communal learning etc.
    - Early Writing Systems: It started at Mesopotamia, Egypt for recording and transmission of knowledge.
    - Classical Period: In Greece and Rome formalized education systems (like school)was established.
- **Printing Press (15th Century):** The invention of the printing press in 15th century revolutionized education by making books more accessible and affordable and preparing standardized educational content.
- **Audiovisual Aids (19th Century):** At this stage the emergence of educational technologies such as the chalkboard, lantern slides and magic lanterns were also used to project images for educational purposes.
- **Early 20th Century:**
    - Motion Pictures: The use of educational films for teaching purposes began at this phase. Thomas Edison and George Méliès experimented with motion pictures in the field of education.
    - Radio Broadcasts: In 1920s & 1930s educational radio broadcasts became popular in educational field.
- **Mid-20th Century:**
    - Computer-Assisted Instruction (CAI): In the 1950s and 1960s, B.F. Skinner explored the potential of Programmed instruction for instructional purposes. Programs like PLATO (Programmed Logic for Automatic Teaching Operations) were developed for computer-assisted learning.
    - Television: Different educational television programs emerged during the period to cater young learners and promote early childhood education.

- **Late 20th Century to Present:**
    - Personal Computers and Software: The personal computers in the 1980s and 1990s helped for individual learning by using educational software and multimedia applications.
    - Digital Learning: The use of internet changed the scenario of educational technology by using online learning platforms, digital libraries, and virtual classrooms, Massive open online courses (MOOCs), learning management systems (LMS).
    - Emerging Technologies: Artificial intelligence (AI), virtual reality (VR), and augmented reality (AR) are some emerging technologies into educational settings.

1.1.4: Psychological foundation of ET

The psychological foundation of educational technology encompass a range of theories, principles, and research findings from psychology that underpin the development and implementation of technology in educational contexts. There are two approaches in ET, one is hardware approach and another is software approach. The hardware approach is based on Physical sciences and engineering. On the other hand, software approach is based on Psychological principles in education. Here the psychological foundation of educational technology considers how principles of psychology influence different aspects of ET like- design, implementation, and evaluation of technology in educational technology. We discuss some of the aspects of psychology which influence ET:

Behaviourism: Behaviourist principles, like- shaping, law of effect, reinforcement, immediate feedback etc. are integrated into educational technology through different gadgets. This application enhances motivation and engagement of the learners.

Cognitive Psychology: Some of the issues of cognitive psychology such as- remembering, information processing approaches, forgetting are very crucial in designing educational technology.

Constructivism: Educational technology considers constructivist approach of learning, which emphasizes learners' active construction of their own understanding and knowledge through experiences.

Socio-cultural Theory: ET considers different socio-cultural factors that influence teaching-learning process. It includes social interactions, cultural background, and context

of the learners. Online collaborative learning platforms, social discussion forums, and virtual classrooms aim to create such environments that support socio-cultural learning processes.

Motivation theories: Different motivational theories help in designing instructions that enhances extrinsic and intrinsic motivation, self-regulation, and self-engagement.

Individual Differences: ET considers individual differences in learning styles, preferences, and abilities while adapting learning systems, personalized instruction system, and flexible individual learning pathways to accommodate diverse learners' needs.

Assessment and Feedback: There are some psychological principles which help to assess and provide remediation. This psychological knowledge helps in designing software assessment and remediation tools in ET. Formative assessment techniques, immediate feedback, and data analytics contribute to effective assessment practices.

Memory & Forgetting: Educational technology considers factors influencing memory and forgetting, like- encoding-decoding process, memory enhancing strategies.

Transfer of Learning: ET aims to facilitate the transfer of knowledge and skills by adapting different techniques like- Drill & Practice by CAI mode, Simulation technique, Problem-solving mechanism etc.

EDE - 418
ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK- 1
Conceptual orientation of Educational Technology

Unit-2
Cybernetics and Application of ET in Indian classroom situation

1.2.1: Cybernetics (Systems Approach)—origin, characteristics, and stages

The term "cybernetics" comes from the Greek word "kybernetes," which means "steersman" or "governor," reflecting its focus on the study of control and communication in living organisms, machines, and complex systems.

Norbert Wiener defines cybernetics as "control and communication in the animal and the machine". In Macy cybernetics conferences it refers to the study of "circular causal and feedback mechanisms in biological and social systems". Overall, we can say that cybernetics is the 'science of communication and control'

Origin of Cybernetics:R. Vallée in the book 'History of Cybernetics' mentions the following as the origin:

> *Cybernetics began properly with the publication, in 1948, of a book by Norbert Wiener entitled "Cybernetics or Control and Communication in the Animal and the Machine". The word cybernetics had been chosen by Wiener, in agreement with other colleagues, from the Ancient Greek kubernetike, or the art of steering. Another initiator, almost as important as Wiener, is Warren S. McCulloch who published, in 1943, in collaboration with N. Pitts, an article on logics and the nervous system.*

Characteristics of cybernetics: The following are considered as characteristics of cybernetics:

- Feedback: IT emphasizes the importance of feedback loops in systems. This feedback mechanism enables a system to self-regulate and maintain stability.
- Control and Regulation: It deals with the how the process of a system is controlled or regulated for achieving the desired outcomes. That means cybernetics is related with the concept of systems approach.
- Communication: Communication plays a vital role in coordinating the behaviour of system elements and enabling them to work together towards common objectives. Cybernetics evaluates how the information is transmitted and processed within a system.
- Adaptative: Cybernetic systems are capable of adjusting their behaviour in response to changes in their environment or internal conditions.
- Interdisciplinary: Cybernetics considers the concepts and methods from various disciplines, including mathematics, physics, biology, engineering, psychology, and sociology for integrating knowledge from different fields to understand the behaviour of complex systems and design effective control strategies.

In summary, we can say that cybernetics offers a holistic approach to studying systems dynamics, emphasizing the interconnectedness of components, the role of feedback mechanisms, and the principles of control and communication.

Stages of Cybernetics:

After considering different viewpoints of experts a common framework includes the following stages:

Early stage of development (1940s-1950s): The origins of cybernetics can be traced back to the work of Norbert Wiener, Warren S. McCulloch and others in the 1940s. This period saw the formulation of feedback mechanisms, control systems, and communication processes in both biological and artificial systems.

First-Order stage (1950s-1960s): During the stage the focus was primarily on understanding and modelling systems as closed-loop control mechanisms. This period saw the development of mathematical models and theories to describe feedback systems, such as control theory and information theory.

Second-Order stage (1970s-1980s): This stage marked a shift from viewing systems as passive objects to recognizing the role of the observer in shaping the system's behaviour. This stage introduced concepts such as reflexivity, self-reference, and the observer's participation in the system.

Third order change (1980s-Present): During this stage cybernetics expanded its focus to encompass the study of complex systems across various disciplines.

Contemporary stage of developments: Now cybernetics has continued to evolve with advances in technology, computation, and interdisciplinary research. Applied cybernetics has found applications in fields such as artificial intelligence, robotics, bioinformatics, organizational management, and social systems modelling. Contemporary developments in cybernetics often involve the integration of cybernetic principles with other theoretical frameworks, such as network science, cognitive science, and evolutionary theory.

1.2.2: Application of ET in Indian classroom situation

Educational technology is a very effective tool for improving the quality of education. It can be applied at all levels and all disciplines. In India, due to limited educational sources in some areas and the diversity of students' backgrounds and needs is vast, there may be some problems of application of educational technology. Here we discuss major educational technologies suitable for Indian classroom setting:

Mobile Learning Apps: Provision of widespread availability of smartphones, mobile learning apps are easily assessable in remote areas with limited infrastructure. These apps can deliver different learning content across a variety of subjects and languages.

Low-Bandwidth applications: Considering inconsistent internet connectivity, educational technology should be designed to operate on low bandwidth. It includes offline modes for accessing content, text-based resources etc. that consume minimal data.

Open Educational Resources (OER) and Digital libraries: Open educational resources can be used for teaching, learning, and also for research. Platforms like the National Repository of Open Educational Resources (NROER), NCTE OER portal, NCERT portal etc. in India provide a wealth of resources, including textbooks, videos, and interactive simulations. On the other hand, Digital libraries [like- National Digital Library of India (NDLI)] offer access to a wide range of educational materials to support teaching and learning at all levels.

Radio and Television: Where internet access is limited, Radio and Television broadcasts can be effective tools for delivering educational content related to literacy, numeracy, health, and agriculture, catering to diverse audiences.

Interactive Whiteboards: This type of interactive boards can enhance classroom teaching by incorporating multimedia elements and interactive activities.

Assistive Technologies: Assistive technologies, such as screen readers, speech recognition software, and accessible e-books, can be used for supporting students with learning disabilities.

1.2.3: Let us Sum up

In this module we have discussed the meaning of Educational Technology in the light of genesis and development of the concept of Educational Technology. This portion is discussed in two perspectives. Next,we have discussed psychological foundations of ET. Different theories, principles, laws have influenced ET in many ways. Some of the foundations have been discussed in this module. After that, we have introduced the concept, origin, nature and stages of cybernetics. Finally we have discussed the applications of ET in Indian classroom situation considering the issues like- low internet connectivity, divergent needs etc.

1.2.4: Assignment

1. State the meaning of Educational Technology-I, II, and III.
2. Discuss the genesis of ET on the basis of technological inventions.
3. Expalin the influence of Behaviourism, Cognitivism, and Constructivism on ET.
4. Describe the stages of Cybernetics.
5. Discuss different application of ET in the context of Indian classroom.

1.2.5: Suggested Readings

1. Novikov, D.A., (2015) Cybernetics: from past to future. Heidelberg: Springer.
2. Selwyn, N., (2011) Education and Technology: Key Issues and Debates". Great Britain. Blumsbury.
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EDE-418
ADVANCED EDUCATIONAL TECHNOLOGY (Elective)

BLOCK-2
Communication Technology

Unit-I
Theories and Models of Communication

CONTENT STRUCTURE

2.1.1: INTRODUCTION

Civilization is reflected in three priceless possessions of mankind, first is the human ability to think, second being his innate capacity to communicate and third is his species-specific competence to acquire and use the arbitrary symbol system of language. The process of communication permits us to use and reuse the experience of others in present and in future. Communication is the means by which people relate to one another.

Communication is basic to all human performance and interaction. It refers to the transmission of thoughts, information and commands by employing the sensory channels. The message should be conveyed undiminished and without distortion.

The process of interpersonal communication is both, an art and a science. The art of communication has its roots in the principles of psychology and the science, in the use of technology for communication. It is, therefore, necessary to understand and apply the principles of psychology and practice the use of audiovisual materials.

2.1.2: OBJECTIVES

After going through this unit you will be able-

- To understand the meaning and concepts of communication;
- To describe about the process, aspects and essentials communication.
- To explain the barriers of communication;
- To suggest means to overcome barriers to communication;
- To explain models of communication;
- To employ appropriate graphs and charts for communication.

2.1.3: MEANING AND CONCEPTS OF COMMUNICATION

Good communication skills are one of the essential skills to make a good teacher. The teaching process involves constant transmission of ideas, thoughts, information, instructions,

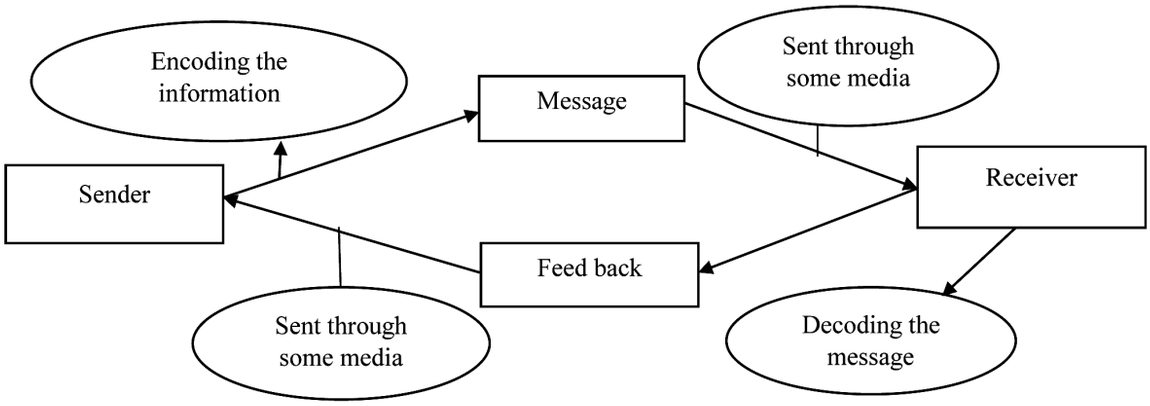
questions and responses between the teacher and the taught either by speech, writing or through signs. Unless the teacher has good skills in communicating, part or all of what he or she teaches may be lost on the way. Communication skills are not necessarily acquired by birth, but can be cultivated.

The word **'communication'** has its origins in the Latin word **'communis'** which means **'common'**. It indicates common experience between people. Communication has been defined as 'sharing of ideas or feeling', 'interaction', or sharing of experience. The world is very vast. So many things are happening and it is not possible for one to have first-hand experience of all the events that are happening around the world. Hence, there is a need for sharing the experiences to learn more and more. People witness, take part in and experience pleasant and not so pleasant events, think about these events, feel happy and sad and wish to share their experiences, feelings and emotions with others. Hence, arises the need for the process of communication. Communication may be oral, written or through signs and body language. The primary activity that goes on in the classroom situation is communication between the teacher and students in the form either lecture, presentation through audio-visual aids, questions and answers, assignments, show of anger or appreciation on the part of the teacher, show of boredom or curiosity on the part of the students, in short almost everything that goes on in the class.

2.1.4: THE PROCESS OF COMMUNICATION

Let us imagine a few situations. The teacher is teaching in the class; suddenly she asks a student, who appeared to be very attentive, a question. Now, the boy puts up a very blank face. He just did not know what the teacher was teaching or what question she asked. Where is the problem? Perhaps the boy was not listing at all to what the teacher was saying. This cannot be called a communication from the teacher to the student. But the blank face put up by the student communicates to the teacher that the boy had not understood and she reacts by explaining again. Thus, the blank face put up by the boy involved a communication. Another situation could be where a teacher is teaching but students have not understood properly. The concepts taught are not clear to the students. Therefore, no proper communication happened. These examples show that mere saying (or writing or indicating) a thing is not communication till the massage is understood properly. A proper communication has a cycle as shown below:

Communication Cycle



It can be seen from the diagram that communication process has four main components:

1. The Sender: The one who sends a message. In technical terms, the source of communication is known as 'encoder'.
2. The Message: Some message is sent by encoder or the sender transmits the message through some medium.
3. The Receiver: the receiver is to whom the message has been sent. The message may be for a single person or for a group. The receiver is known as 'Decoder' - the one who tries to understand or interpret the message.
4. The Feedback: Feedback involves the reaction of the receiver. Feedback is the heart of communication. It tells whether the communication has been understood property or not. The communication cycle is complete only when the message is understood or interpreted properly.

2.1.5: ASPECTS OF COMMUNICATION

Before communicating one should keep the following aspects in mind to ensure good communication:

- **When to Communicate:** The timing of the communication is extremely important. Right words at the right time are the key to communication. Imagine a situation where a husband has to attend an important meeting, the taxi he called for has not arrived and he is getting delayed. Suddenly the wife says 'come early in the evening, I have to go for shopping'. This communication from the wife at that particular time would hardly have any meaning. This would only irritate the husband.

Another example may be that of a child who is crying to go to the market and the mother tells him to study; the communication would not be effective.

- **How Much to Talk:** There are people who are by nature tempted to talk. At the slightest provocation they would start speaking without a break. It is common to come across people who go on suggesting medicines to a person who just casually mentions about his sickness. In a classroom situation, repetition of a topic can decrease the interest of students in the class. It has to be carefully decided as to how much time should be allotted for each subject.
- **Whom to Talk:** Captive audiences always try to escape. A child is studying; He observes that now it is time for watching the cartoon show in the T.V. At this time if the mother insists on continuing the studies and does not allow him to watch cartoon, the child would feel as being captive. In other words, the target group to whom one has to talk should be willing to listen. It should not be like a musician giving a concert before an audience with no ear for music.
- **How to Talk:** Another important aspect of good communication is how to talk. It involves consideration of the needs and feelings of others. A child who worked hard but could not get good grades in the examination needs emotional support. Recounting the mistakes he has committed or a comparison of his performance with that of others who have received good grades would not help him. The feelings of the person should be given due consideration before speaking.
- **Where to Talk:** Physical setting and social climate matters a lot in communication. For a lecture in the class, the room should be noise-free with proper lighting and sitting arrangement. A child would not be able to concentrate on the tuition given by the tutor if his brother or mother is watching an interesting movie on the television in the same room. Similarly, in a remote tribal village, lecture about modern technology would not be of much use.
- **Why to Talk**: The purpose of communication should be kept in mind. A student who comes to the teacher may need some information, or he may have some problem, which requires some action on the part of the teacher. Communication should be restricted to the purpose only.
- **What to Talk:** It has been said that 'fewer the objectives, shaper the communication'. When given a chance to speak, there are people who would like to speak non-stop without any relevance. Talking with specific objectives leads to good communication.

2.1.6: ESSENTIALS OF COMMUNICATION

There are seven essentials of an effective communication, which are known as **'7 Cs'** of communication.

1. **Clear:** The communication should be clear so that it can be understood properly by the receiver. Consider the following communication:

   'He said to her that he was going out, he might be late, she may or may not wait for him for dinner. In case there is any message from his office, she should inform him'.

   In this communication there is no clarity. It is not known where the person is going or where she should contact him in case of any message. It is also not clear whether she should wait for him for the dinner or he would eat outside. Such of communications create a lot of confusion.

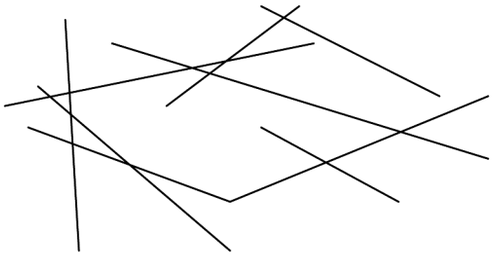
2. **Complete:** A message that 'Aunty has met with an accident, go to hospital', is not complete. It does not tell in which hospital she is admitted. Incomplete messages do not prepare a person to face the actual situation. In a classroom situation, the monitor of the class comes in and says 'Inspection would be held in the school, teacher wants all the students to be well prepared', this communication is incomplete as it does not indicate the date and time of inspection. Student would not understand what preparations are to be made for the inspection.

3. **Concise:** The communication made should be to the point conveying exactly what is intended to be conveyed. An unending one-way flow of communication does not convey the desired information. The teacher, annoyed with the performance of the class, starts scolding the students, says a number of things that are irrelevant to the present performance between which she also mentions about the mistakes committed by the students. Students may not be able to separate out the actual information intended to be conveyed by the teacher from the whole communication. Another example can be of a class where everyone tries to speak at a time and all the communication gets muddled.

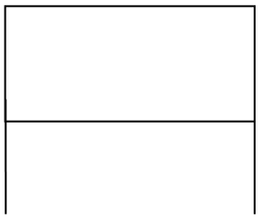
4. **Courteous:** The communication should be in a calm and courteous manner, unless the objective of the communication is to convey displeasure. It should be like bursting like a bomb.

5. **Concrete:** There can be two types of communication- planned and unplanned. While planed communication is systematic and concrete, unplanned communication

is haphazard. Effective communication needs planning. When a teacher goes to the class, it is necessary that he prepares the lecture – not only the content but the sequencing, the methodology, the time scheduling etc. When the teacher comes to the class without preparation, he cannot communicate well and make the students understand the topic. Unplanned communication is like a number of jumble line segments, while planned communication is like a square.



Unplanned Communication



Planned Communication

6. **Correct:** It is important to ensure that the information that is being passed on to the other person is correct and authentic. A teacher should be well prepared in the subject he or she is teaching as wrong information may mislead the students. In case the teacher does not know something, he should, instead of giving wrong information, tell the students that he would confirm the information later. There are instances where teachers gave the wrong information and when the mistakes were pointed out by the parents, the children either did not believe them as they had more faith in the teachers or they had lost their faith in the teachers.

7. **Candid:** One should be frank in expressing one's opinions while communicating. The communication should not convey a false impression. If the teacher does not know something, it is better to admit the fact instead of going round in circles or browbeating the child. One should also be impartial and open minded while communicating. If one has a rigid mind or is biased, he would not be open to suggestions or to new ideas. There may be students who are well prepared in a subject and may have a lot of information which they may like to share with others in the class. The teacher should provide such opportunities in the class without any pre-conceived ideas.

2.1.7: BARRIERS IN COMMUNICATION

The effectiveness of communication depends on the presence or absence of the elements and conditions, facilitating the proper flow of communication. It can be certain factors that can hinder the smooth process of communication. These factors may be internal i.e. relating to the individual (sender or receiver) or external (the noise, the inadequacy of media to communicate, the language etc.). In this section, the likely barriers to good communication are discussed:

(a) Internal Barriers: Internal barriers relate to the individual. The individual may be either the sender or the receiver or both. The sender or receiver may be a single individual or a group of people. Internal barriers are also known as psychological barriers. Some of these psychological factors are:

Ego: People believe what they say only is right. They do not accept or even consider the other's point of view. The communication, therefore, becomes one-sided. This create gap between what is and what should be. Due to this gap, communication does not show the reality. The person who is communicating is not truthful.

Assumption: Sometimes a person who is communicating assumes that whatever has been conveyed has been understood or that the receiver is aware of certain things.

Selective Attention: It should be kept in mind that the persons who receive the communication display selective attention. Certain details received are ignored and only the main points of interest to them are retained. There is, thus, a desire on the part of the receivers to make the communication simpler. Sometimes, the information received is altered or information not intended by the sender is added while interpreting. Communication is understood according to one's perception. Due to all these factors, the communication gets distorted. One tries to listen to what he likes to listen or what makes him comfortable. See the following example-

> 'A student, who is not good in mathematics and gets scolded by the teacher very often, does not like her. He passed by two other students, talking among themselves, one saying that the mathematics teacher was not the staff room when he visited there and the other responding that she might be coming late to the class or perhaps she is busy somewhere else. Now, this boy misinterprets this communication and reacts, 'Oh! So nice, mathematics teacher has not come to the school today.'

This modification of the message by the receiver is known as distortion. There is greater possibility of distortion when the communication passes through a number of channels, as

for example, the headmaster telling a teacher something to be conveyed to all students, the teacher telling other teachers to do so, each teacher telling a boy in their class to do that and finally these boys informing all others in the class.

Lack of Interest: When a person is not interested in a subject, he may not listen to understand the communication. Lack of interest is one of the major factors that hinder a good communication. In a classroom, it is the responsibility of the teacher to make subject interesting. The students who aspire for being engineers or doctors take interest in science subjects and do not like the subjects like history or civics. The lack of interest in the subject results in getting poor grades in these subjects. The teacher should be able to convince them how the knowledge of these subjects could be useful in their future career aspirations.

Inhibitions: Inhibitions or emotional blocks are other barriers, which have a strong impact on communication. Certain subjects that have some stigma attached to them due to traditional values are generally not discussed with an open mind and therefore, adequate communication on these subjects is not possible. For example, parents are not able to communicate adequately with their children about sex related issues. Moreover, if a person is very emotional on certain issues he may not like to communicate on them properly.

Personal Bias: Everybody has his own opinion about various issues. An unbiased communication may not take place due to this personal bias. For example, if the teacher has some strong opinion about certain religious activities, his communication on this issue may have subjectivity. Another example is that of a teacher who, due to some false reason, forms a prejudice against a particular student and his communications with that student are always influenced by such prejudiced by such prejudice.

Need to Impress Others: There may be a personal desire to have an impact on others through communication. Just to influence children, a teacher may tell things, which may or may not be correct but may create interest among students. For example, some teachers start talking about their personal lives or their own experiences, which may not be relevant for the topic to be taught in the class.

(b) Language Barriers: Language barriers also create hindrance in proper communication. Such barriers may be created by using a language not understandable by students(for example, teaching in English medium, when the students are not exposed to that language), lack of understanding of various words, phrases or sentences used by the teacher or students (e.g. students using slang or computer teachers using their own

terminology like 'blog' or 'spam'), wrong choice of words while teaching, lack of proper accent or pronunciation while speaking, or using audio-visual aids which are not conveying the matter properly (e.g. lack of clarity in graphs). Sometimes, the same word has different meanings. One word or phrase may also convey different meanings according to the context in which it is spoken. For example, saying 'Yes, you are very intelligent' may have different connotations according to the way it is spoken (e.g. statement of fact or satire). A teacher should keep in mind these language barriers and try to take a feedback from the students through various means like asking questions.

(c) Background Barriers: Socio-cultural background of the sender or receiver and previous knowledge on the subject or lacks of it are important background barriers to effective communications. A teacher coming from a different cultural background and with a different value system (say, an Englishman teaching in a village school in India) may not understand the value system of the students, which may create problems in communication. Previous knowledge on the topics taught may also create problems. If the teacher is not up to date with the latest developments and students are aware of the new ideas, it may create barriers in communication.

(d) Physical Barriers:

Noise: there may be various types of noises between the communicator and the listener. This noise may be mechanical, social, personal or psychological. For example, if the communicator is using a medium (e.g. telephone) there may be some transmission disorders. Semantic problems may also work as a noise or if the classroom beside a busy road, external noise may disrupt communication in the class.

Space: The space between a communicator and a listener is also important. An intimate space between a mother and a child may have a positive impact upon the communication but the same space between students and a teacher may not be desirable.

The Environment: The environment also plays an important role in communication. If students in the class are not able to hear the teacher properly or the sitting arrangement is not adequate or there is no learning environment, proper communication would not take place.

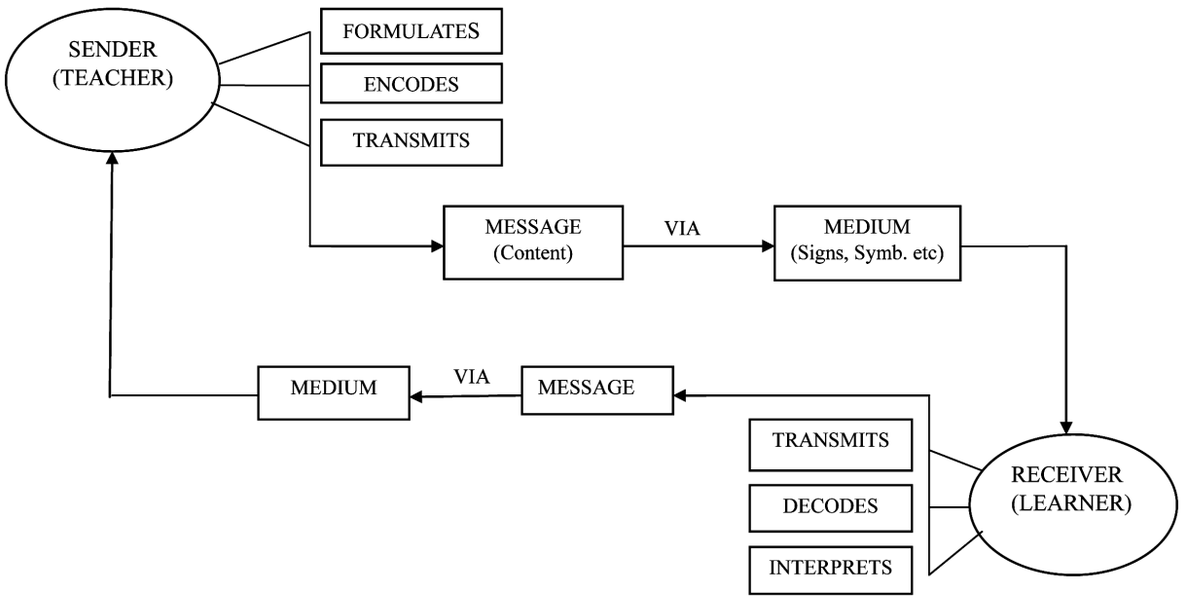
A Summary Table of Barriers in Communication

Intemal Barriers	Language barriers	Background Barriers	Physical Barriers
• Ego	• Choice of words	• Varying socio-cultural	• Noise
• Assumptions	• Inadequate accent	• background	• Space
• Selective attention	• Lack fo knowledge	• Different value	• Environment
• Lack of Interest	of words	• system	
• Inhibitions	• Lack of oratory skills	• Prevlous	
• Personal blas	• Tone of speaking	• knowledge	
• Desire to impress others	• Semantics		

2.1.8: MODELS OF COMMUNICATION

Communication from a person to another or some other persons may be modelled in terms of a sender, receiver(s) and the channel(s) of communication. The signal being communicated is called the message.

The sender, being better informed or in a superior position, wishes to transmit a message. The message may consist of thoughts, information, feelings or commands. In fact, the sender's mind conceives an idea (Ideation) which is encoded into a message. It is the message which is transmitted through the sensory channels. The receiver, at the other end, receives the message as it arrives. The message is usually distorted and diminished. The receiver's mind then decodes the message to perceive its meaning.
The channels of communication refer to the five senses of perception. In most cases one or two channels are utilised. Often the sense of sight is underutilised and the sense of hearing is over utilised. In other words, the visual channel has spare capacity and the audio channel runs saturated, both operating at sub-optimal efficiencies. Further, there is 'noise' i.e., undesirable inputs due to factors called barriers into the system to diminish or distort the message. Noise may be introduced at the sender end, e.g., speaker not finding the right words or stammering or writing illegible. It may arise in the channel of transmission, e.g., echo from the walls, reflections from the board of invisibility of the written word. Noise may be generated at the receiver end, e.g., lack of vocabulary, inattention or imperceptions.



2.1.9: LET US SUM UP

Communication plays an important role in human relations and also in teaching learning process. It can be defined in many ways. Simply it can be said that communication is the process of transmitting and sharing ideas, feelings, concepts etc. The components of communication process are sender, message, media, receiver and feedback. The sender encodes the idea into message and transmits it through some channel, and then receiver receives and decodes the message and provides necessary feedback. Before communicating one should keep the different aspects in mind to ensure good communication. There are seven essentials of an effective communication, which are known as **'7 Cs'** of communication; Clear, Complete, Concise, Courteous, Concrete, Correct and Candid. If the components are not implemented properly they may become the barriers of communication. The common barriers are internal, language, background and physical barriers. There are several steps of the communication process, where the sender encodes the idea into a message with a specific goal. Encoding is the process by which the sender converts the idea into a message by using verbal or non-verbal media. The receiver decodes the message. Decoding refers to the process of translating words, signs, symbols etc. into meanings.

2.1.10: ASSIGNMENT

1. Mention the concept of Communication. Explain the process of communication.

2. Describe different aspect of Communication. What should be the essentials of Communication?
3. Discuss the barriers of Classroom Communication. Explain the strategies to overcome these barriers.
4. Explain the Models of Communication.

2.1.11. SUGGESTED READINGS

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EDE-418

ADVANCED EDUCATIONAL TECHNOLOGY (Elective)

BLOCK-2

Communication Technology

Unit-II

Mass Communication, Verbal and Non-Verbal Interaction in Classroom Communication

CONTENT STRUCTURE

2.2.1: INTRODUCTION

The message conveyed by the teacher and or the educational media may be verbal or visual and the receiver may listen, see or examine and react in other ways. The communication channel in the classroom should ideally carry both messages and counter messages. Effective communication is the essential requirement for having an effective interaction or getting maximum advantages from the process. In this way, the degree of the effectiveness can be judged from the amount of advantages drawn through it. Now the question arises what should be done for realizing the utmost effectiveness in communication. The answer is well linked with our attempts in improving each component or element involved in process of communication.

2.2.2: OBJECTIVES

By the end of this unit you will be able-

- To list, describe and distinguish different types of communication;
- To state the role of verbal and nonverbal forms of communication;
- To understand the Teacher's role in Classroom Communication;
- To explain the meaning and importance of Multimedia;
- To understand the concept of Mass Communication;
- To understand the meaning and concept of Convergence;
- To state convergence as a phenomenon with its goal and important convergence objectives;
- To explain convergence application like Internet, radio and Interactive TV.

2.2.3: TYPES OF COMMUNICATION

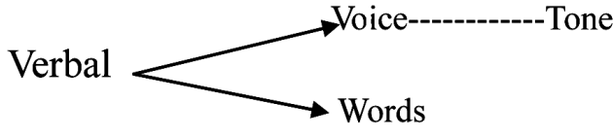
Communication has been classified in several ways: (1) verbal and non-verbal communication, (2) vertical and horizontal communication, (3) oral and written communication, and (4) individual and group communication.

1. Verbal and Non-verbal Communication:

Verbal Communication

Language is the key and the base of any verbal communication. Each society develops one or more forms of languages with spoken or written words for communicating with each other. Accordingly, we have local, regional, national and international languages for the required communication. The basic units of any language are words and sentences which are governed by the rules of the grammar. Language can make use of one of the three forms: (i) oral, (ii) written and (iii) oral and written. In the oral form, one can communicate one's feelings, thoughts and intentions to others by the speaking and listening channel. For this purpose, the sender/communicator makes use of some precise and distinct sounds which when heard by the receiver, are decoded for understanding their meaning. In the written form of language communication, the communicator/sender makes use of the script of the language such as Devnagari for Hindi and Gurumukhi for Punjabi. For the communication of thoughts and feelings one writes about it through some written mode, pencil, paper or chalk, board or print media and the person at the receiving end understands the meaning of the communicated message through its reading and decoding.

In the usual classroom communication, a teacher while writing on the blackboard also makes use of language for the explanation and exposition of the written contents. In this way, the oral form combined with written form of communication or vice versa always proves more effective than any of these forms used separately.



Non-Verbal Communication

The communication process can also be carried out without the use of any verbal means. In many cases, (such as communication with deaf and dumb, mentally retarded, the persons not knowing the language of the sender or sending a secret message in the commonly coded and symbolic expression), it may become a necessity as well as compulsion to make use of the non-verbal communication. In the normal situations also, the non-verbal media is generally used for giving strength and effectiveness to the verbal communication. Some of these important modes of non-verbal communication are discussed below:

- **Facial Expression:** Facial expression may very well communicate the feelings, thoughts and intentions of the communicator. In general, face and facial expressions may be said to be a true index of one's emotional and thinking behaviour. When one is perturbed, his face gives the identity of the level of the anxiety and stress. Similarly, when one is in a happy or joyful mood, his or her facial expression reflects it. It may also be seen that much of the language of the facial expression is almost similar and universal to all around the world. Seeing the facial expression, we can easily conclude if one is angry, fearful, jealous, astonished or showing love, sympathy or hatred. In this way facial expression may be termed as one of the important modes of non- verbal communication.

- **Language of the Eye:** Language of the eye may be considered as another important mode of non-verbal communication. Eyes, in fact, may forcefully convey all what is intended to be communicated by the communicator. Language of the eye may also be considered as common and universal to almost all cultures and societies of the world. The various idioms and phrases showing movements and actions of the eyes like 'Aankhe Bichhana', and 'Ankhe Dikhana', easily provide valid testimonial of its role in communication.

  The language of the eye movements is somewhat so universal and familiar that it is very easy and simple to decode the feelings, thoughts and intentions conveyed by the communicator. When one turns his eves, we can conclude that he is not interested in our friendship or conversation or wants to avoid us. Similarly, one can communicate well his emotion of fear, jealousy, anger, enjoy, hatred, greediness, temptation, lust, love, affection, apathy or sympathy, etc. through the eye language. Actually eye-to-eye contact forms the very basic of effective communication. When one focuses his having eye-to-eye contact with someone in conversation, it means that he thinks someone quite for important for conversation. However, the way he gazes may convey his liking or disliking for the person.

  In the class room communication, the necessary interaction links between the teachers and pupils are mostly maintained through the related eye language. The eye movements the teacher may encourage or discourage a student in giving response or participating actively in any teaching-learning activity. Similarly, by reading through eye movements, the teacher can know whether the student is showing interest or disinterest in any classroom activity.

- **Body language:** Our body has an impressive and effective language for communicating our feelings, thoughts and actions. A classical dancer while performing on the

stage may provide a substantial proof of the effectiveness of such communication through various gestures, postures and movements of her body parts. By seeing the body language, you may well conclude that now she is offering prayers, getting annoyed, nervous, tensed or feeling shyness, fearful, angry, jealous, envious, anxious, in love, or affection. The body language although seems to be somewhat universal and common, yet has a perfect cultural and social base. As a result, every culture or society has its own body language which can be learnt the same way as the spoken language. Hence, one should be quite cautious while making use or interpreting of body language in communication. Some few instances for this purpose are as follows:

- In Tibet, the tribal people exchange greetings by protruding their tongues. In India it will be communicated as insulting and teasing to the receivers.
- In India, someone may use one's stretched open palm for conveying the stop signal. However, doing such in Greece will be an outright insult to the receivers.
- In the western culture, the people may welcome or greet through kissing, whereas kissing in public is not liked in India. We usually welcome or greet through join hands, touching feet or shaking hands, etc.

The body language in its s broad form may include various types' movements of the body parts. In such a broad form, it is quite commonly used by all speakers, stage or media actors, political and religious leaders, lower and advertising model while giving their performances at their workplaces. In our day-to-day conversations, we all are quite habitual to make use of it for communication. We convey the feelings of respect to our elders by touching their feet, welcome through joining our hands or say good bye by shaking or raising our right hand. Our body speaks about our feelings of anxiety, fear, anger, happiness, sadness, love, affection, heatedness, empathy and sympathy through its various actions and movements. The body language can be very effectively used by the teachers and pupils in the classroom for the healthy classroom interaction in almost all types of teaching-learning situations. The teachers may add colours and effectiveness to their explanations, expositions and demonstration skills, with the use of appropriate body language.

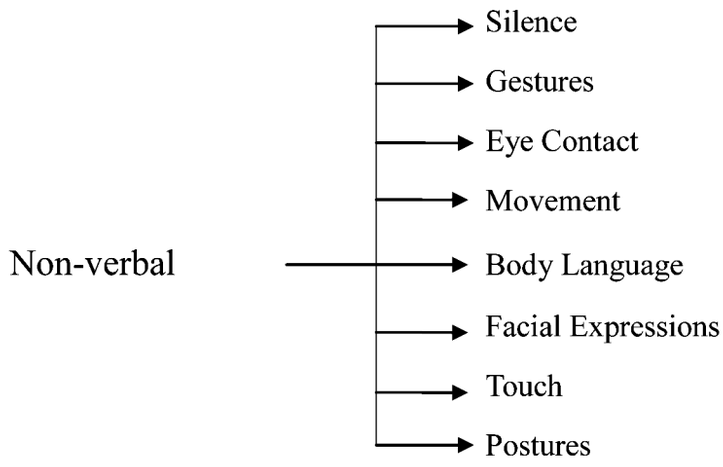
- **Sound symbols:** Many sound symbols and vocal cues also prove an effective medium for the desired communication. For example, when we are saying, narrating or explaining something to somebody and he is responding simply by uttering the sound hunh-hunh, it may work well for maintaining the chain of communication.

We may properly visualize that he is paying attention and agreeing to the message communicated to him. Contrarily, when the listener utters the negative sound 'unu hunch' it means his disinterest or disagreement to the conveyed message. It becomes more distinctive and prominent when he also nods his head and neck along with the utterance of the negative sounds. Similarly, the, utterance of the sound 'uanh' accompanied with the turning of the neck and twisting of the nose may provide a signal of one's complete disliking or even feeling of hatred. In addition to playing the role of a mediator or reinforcer in conversation, the sound symbols or vocal cues may effectively act as potent carrier and conveyer of one's thoughts and actions. For example, when one is making a pleasant sound through whistling or humming, we may know that he is in a pleasant and happy mood and when one utters 'hunn' with anger he is said to be in angry or fighting mood. However, the interpretation of the sound symbols can only be made in context to the tone, volume and the situation prevailing at the time of the utterances of these sounds, i.e. whistling may be made to tease, attract and making indecent remarks to somebody.

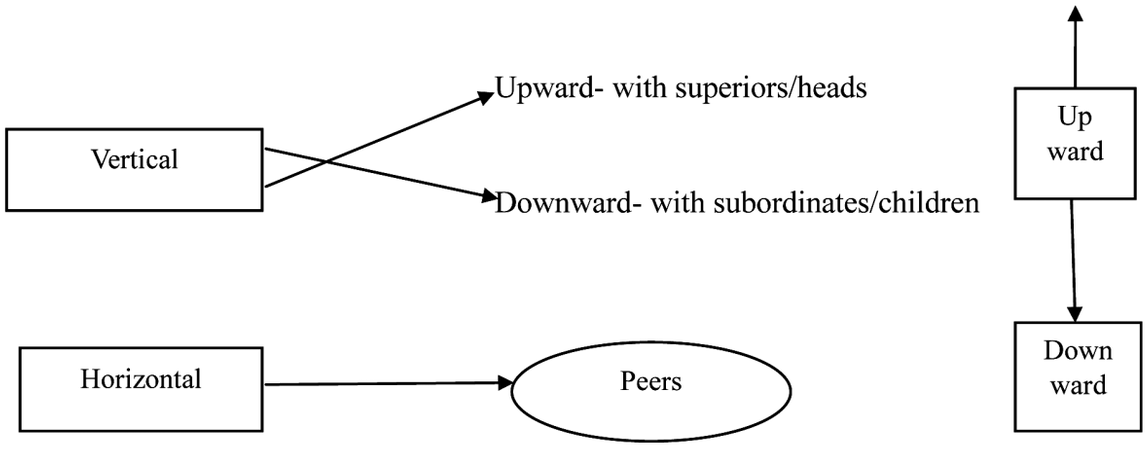
- **Symbolic code language:** Many times some special code language can also be used as an effective mode for the desired communication. The special code language prepared through the help of various gestures, postures and body movements can be used for communicating with the deaf and the dumb. You may very well judge the effectiveness of such communication if you have ever seen the telecasting of the AIR news bulletin specially meant for the deaf and dumb population. One can also mix vocal cues and sound symbols with the body language for having a code language. Since it is to be commonly shared, it must be well understood, used and interpreted in any form by its users. The users (Senders and receivers) thus are free to invent any set of code language using any type of verbal and non-verbal symbols commonly shared among them. In the Mahabharata, Krishna made use of such a coded language telling Bhim how Duryodhana could be put death during the 'gada yoddh'. In the Ramayana also Ram and Lakshman had an essential communication with help of their own code language for dealing with Surpanakha, the sister Ravana.

In our day-to-day life also, we must have heard some children and youngster often talking to each other in their own code languages. One may feel helpless in making any since of their communication but they have their language for proper communication. Similarly, various types of well-thought and organized code languages are very effectively used is exchanging

quite meaningful and secret information by the detective and security agencies operating all over the world. In this way, any commonly shared code language may prove as effective mode for the desire communication between the shared group members.

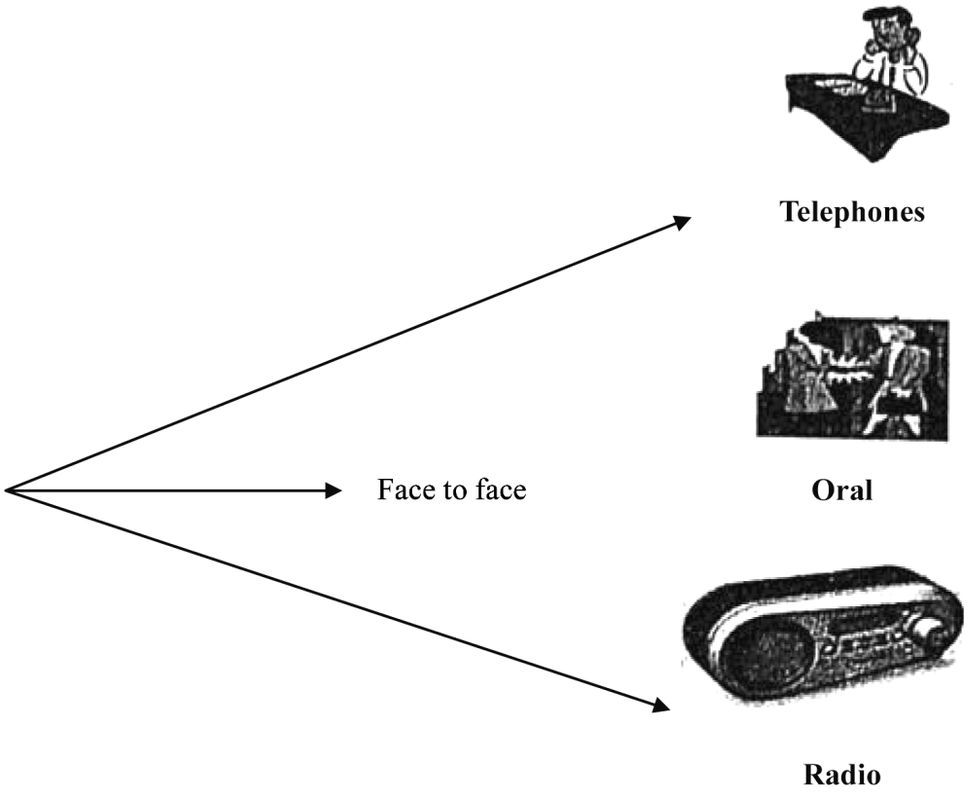


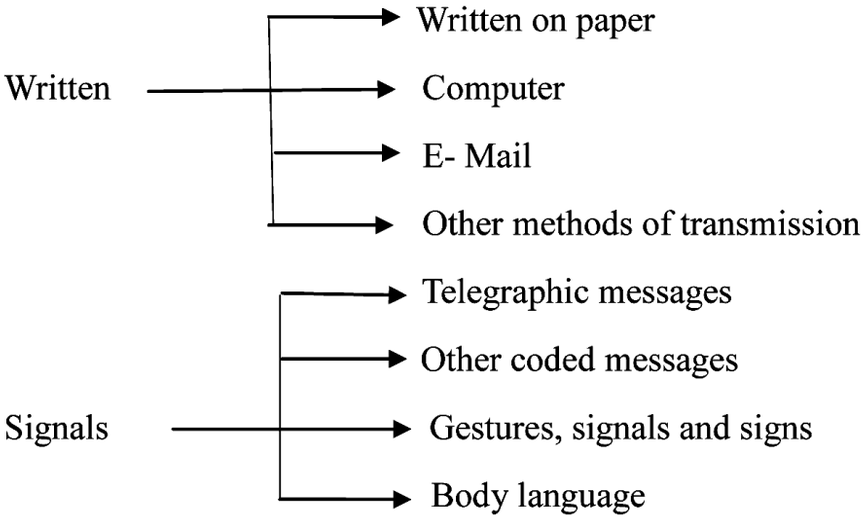
2. **Vertical and Horizontal Communication**: Vertical and horizontal communication is according to the hierarchical relationships between the sender (communicator) and receiver (target group). If a principal issues instructions to the teachers, it would be vertical (downward) communication. If a student sends a leave letter to the class teacher, it would be vertical (upward) communication. On the other hand, if one teacher requests another to take his class, it would be horizontal communication.



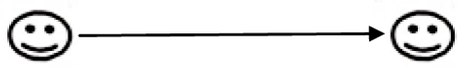
3. **Oral, Written or Sign Communication:** This classification is based on the medium used for the communication. The most common form of oral communication is face-to-face exchange between the sender and the receiver, like two friends engaged in conversation or a leader addressing a public meeting or a teacher giving a lecture in the class room. Oral communications also take place through media like telephones

and radio. Written communications can be letters written on paper and sent through ordinary mail, e-mail communications and faxed messages. In addition to oral and written communication, a variety of messages are communicated through signs and signals. Telegraphic messages, signals, like nodding one's head in agreement, clapping in appreciation, frowning to show displeasure, trembling indicating fear or anger are all examples of communication through signs.

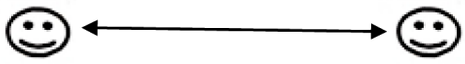




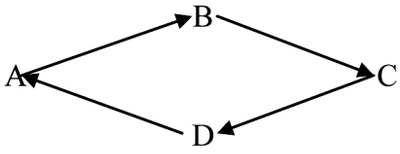
4. **Individual and Group Communication:** This classification is on the basis of extent of interaction. This includes single channel, two way and multi- channel communication. It may also be classified as one-to-one (one -way or two- way) or one- to-many (one- way to two- way) or many-to-one (one- way or two-way).



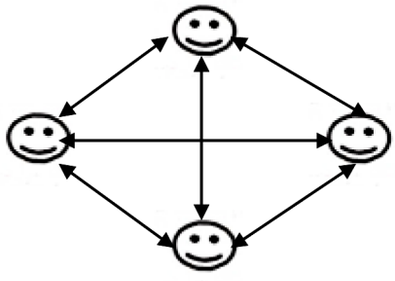
Single Channel



Two-way Communication



Circular Communication



Multi Channel Communication

2.2.4: TEACHER'S ROLE IN CLASSROOM COMMUNICATION

Classroom communication is very important in teaching-learning as it is the chief means by which the teacher and the students work together. In the words of R.E. de Kieffer and Lee W. Cochran, "Effective teaching and communications are synonymous, for good teachers are clear communicators and good communicators as effective teachers.... Our society today has a vast array of modern media of communication.... These modern media are among the tools, the education profession uses to mould and shape human minds." Good teaching, in

fact is intercommunication. There must be reaction and interaction with constant feedback. Teaching and communication are inseparable. The role of the teacher in the classroom is not only teaching the specific topic but to ensure that students understand whatever he or she is teaching. Moreover, students range of comprehension, both of the language and subject, are very limited and have to be increased. Teacher's responsibility is to understand the communication received from the student and to communicate back at their level. Non-verbal communication is as important as the verbal communication. To be effective, there has to be a proper balance between verbal and non-verbal communication. While in verbal communication, the choice of the word, the language used, the tone, the pitch, the manner in which the teacher speaks and his pronunciation matter. In the non-verbal communication the gesture, the eye contact, the facial expression etc. are important fact in dealing with the students, the manner in which the teacher is dressed up, the distance he maintained with the students – all are important in the effective communication in the classroom. The teacher should keep the following guidance in the mind while communicating with the students:

1. The teacher should have update knowledge of the subject, which should be communicated at the level of the students.
2. The teacher should be clear about the message he wants to convey; he should also know what should be the most effective way to communicate each message.
3. The teacher must choose an appropriate medium for communication; it could be a lecture or video other audio-visual aids. He should know the principle of learning and uses of multi-sensory approaches.
4. The teacher should ensure that students are attentive to listening. He should be able to sustain their attention in the class; therefore, the teacher should make the communication interesting.
5. The teacher should be able to get a feedback from the students from time to time to understand whether his message is understood or not.
6. The teacher should be aware of the communication process, the barriers and other problems of communication and try to remove all these hindrances in communication.

Effective Communication

To make communication process effective in the classroom teachers should:

- Choose words with care- Think like a wise man but communicate in the language of people;

- Avoid making remarks- comments like 'you are good for nothing' or 'He never does any work';
- Be approachable and have an 'open door policy';
- Have a positive approach: Communication needs to be positive; it creates a positive atmosphere and the motto should be 'think positive and speak positive';
- Have an open mind and welcome ideas of others;
- Be sober and minimize emotional reactions;
- Make the lesson interesting: Use 'wit' and 'humour' judiciously;
- Use 'we' than 'I';
- Systematize their thoughts;
- Keep to the point;
- Not talk about them self only;
- Tell in advance what they are going to talk about and its purpose;
- Consults others if necessary;
- Ask for participation;
- Be empathetic;
- Match their words with expression.

Making Effective Listener

Listening is an integral part of communication. A good communicator is also a good listener. A teacher should improve the listening abilities of the students. These abilities also can be developed by:

- *Create Interesting for the Subject:* 'There is no such thing as uninteresting subject, there are only uninteresting people'.
- *Judging only content:* Students should judge the content and not looks of the speakers.
- *Keep patience:* Students should not be over- eager.
- *Look for ideas:* It is better to understand the idea behind the speech instead of trying to remember everything said at that time.
- *Be Flexible:* Students should follow more than one system of taking notes.

- *Train the Mind to Listener:* Concentration is very important for the students. Small disturbances easily distract poor listeners.
- *Understand Difficult Things:* Students should not try to escape.
- *Keep the Mind Open:* Students should not follow the rule 'we listen what we want to listen'.
- *Capitalize on Thought Speed:* 'we think at a speed of 400 words per minute, but speak slow': Students must bear with the slow speed of talker.

2.2.5: MULTIMEDIA

Multimedia refers to the use of more than one media in a situation. In that sense, multimedia is the combination of different media. Multimedia combines five basic types of media into the learning environment: text, video, sound, graphics and animations, thus providing a powerful new tool for education. Before the invention of Computer, multimedia referred to a slide presentation with audio. But now most of the authors have considered that the computer is an essential element of multimedia. Multimedia, nowadays, is considered as any combination of text, graphics, art, sound, animation and video with links and tools that let the teacher/learner navigate, interact and communicate with the computer. Most of the well-organized programmes of the reputed open education or distance education institutions like IGNOU are run through the multimedia approach adopted for the interaction with the learners. In the advanced countries such as USA, UK, Australia, and Canada, it is used in a quite effective way for carrying out a number of on-line courses.

Some definitions of Multimedia

Kleen & Shell, 1994; Najjar, 1996; Tannenbaum, 1998: Multimedia refers to computer-mediated information that is presented concurrently in more than one medium. It consists of some, but not necessarily all, of the following elements: text, still graphic images, motion graphics, animations, hypermedia, photographs, video and audio, i.e., sounds, music and narration.

Galbreath (1992): Multimedia usually means the integration of two or more communication media that can be controlled or manipulated by the user via computer.

McCarthy (1992): the integration of text, audio, graphics, still image and moving pictures into single computer controlled system is Multimedia. When the device allows the user (the viewer) to control what and when these elements are delivered, it is **Interactive**

Multimedia. When the device provides a structure of linked elements through which the learner can navigate, interactive multimedia becomes **Hypermedia**.

Advantages of Multimedia in Teaching-Learning Process

- It makes the process interesting, purposeful and effective.
- It meets different types of needs of the learner.
- It activates more than one sense organ at a time and so information is processed more effectively.
- It is very effective in case of self-learning instruction.
- It helps the teacher to reduce the load and tension.
- It caters the need of Mass Education.

2.2.6: MASS COMMUNICATION

The range, field and application of mass communication is quite wide extensive. It is carried out through different types of mechanical means, appliances and mass media such as radio, television, video, cinema, films, books and literature, newspapers and magazines, e-mail, Internet and teleconferencing, and satellite communication and transmission. Although here we don't have any direct face to face natural communication between the sender and the receiver, yet it is the only way to reach the masses with a meaningful message full of information and education with utmost economy and effectiveness. Any organization, institution or individual can communicate its thoughts, feeling, intentions and programmes to a huge number of individuals or groups within no time with the help of mass media. It has resulted in the globalization of the humanity. In a single moment, we can communicate to the masses in the development of proper channels for carrying out the task of distance education and fulfilling the duties of providing the required information to those who ask for and need it. The masses can send their responses to the source through their writing or show the impact of the message through their actions and behaviours.

2.2.7: MEANING AND CONCEPT OF CONVERGENCE

A network society means one in which a large proportion of the world population is interconnected or networked by some form of telecommunication system and the people

carry out their day-to-day activities using the network predominantly. Day-to- day activities may involves tasks such as banking, ticket booking for travel or entertainment programmes, product ordering, financial transactions, exchange of mails, retrieving of information from a database, downloading of music files, simple telephone conversation etc. Electronic information is central to all these tasks. Activities that are carried out in the electronic domain using networks are usually denoted with a prefix e-such as e-banking. Some of the e-activities evolving in the networked society are as follows:

- e-education
- e-library
- e- banking
- e-mail
- e-journal
- e-marketing
- e- governance
- e-health
- e-commerce
- e-entertainment
- e-newspaper
- e-procurement

To illustrate what e- activities mean, we elaborate two of the above activities. E-education means sign up with a university, pay fees, obtain lessons, submit assignments give examination and obtain results, all via network without having to visit the university actually. In India, IGNOUE is planning to offer e-education in a big way. With an e-library-its resources and services can be accessed on the network without having to physically go to the library. For this purpose, it is necessary to store all the library resources in digital form. A library whose resources are available in digital form is known as digital library. When accessed over networks from remote places, a digital library becomes an e-library. An older terminology for e-activities is online-activities. This terminology is still in vogue as in online-ticketing, online-fund-transfer etc. Convergence in different areas is one of the basic requirements to make e-activities possible in a networked society.

2.2.8: GOAL OF CONVERGENCE

Convergence is not limited to technologies. Convergence, *per se* is a phenomenon covering a wide range of areas such as technology, applications, media, network systems, network access and switching techniques. Convergence is not limited to communications and networks. It is much wider phenomenon covering many technologies and even human resource. For example, convergence is much talked about in automobile industry. There it

refers to the use of electronics, communications and computers in automobile controls and operations. For example, use of radar to sense vehicles or other obstacles ahead on the road and automatically adjusting the speed is possible only when the relevant technologies converge. Another interesting example is us of intelligence in air conditioners. Conventional air conditioners maintain the room ambience according to certain set parameters. Air conditioners with intelligence determine the ideal room ambience and maintain the same. They take into account factors like human biological rhythm, the present heat load, atmospheric temperature etc. in determining the ideal ambience. Artificial intelligence, biological science, instrumentation and computer engineering are some of the disciplines that contribute to producing such an air conditioner. There is little doubt that the world is witnessing a phenomenon of convergence in almost all the fields.

Here we limit our discussions to convergence in the context of network society. The degree of success of convergence phenomenon would determine the speed with which mankind would move towards NEIS. In the context of NEIS, the goal of convergence may be stated as:

> To achieve the capability wherein any network can deliver any service to any platform, and any user with an appropriate consumer device can access any application that runs on the networked world.

In some sense, the goal as stated above is reflection of the famous idiom "Unity in Diversity" in the context of NEIS. Multiplicity of networks and computer platforms would make up the basic infrastructure of the networked world. The networks and platforms would be designed by using a variety of different technologies. There would be a multiplicity of applications and a multiplicity of consumer devices. In the midst of all these multiplicity, there exists the unity of purpose that any user connected to any network is given the capability for accessing any application that runs on any platform anywhere in the networked world. Of course, the user must have the appropriate consumer device that is required by an application. Obviously, a user can not except to access an application that delivers pictures by using a plain telephone set. Currently efforts are on to design and develop integrated consumer devices that are capable of transmitting and receiving audio, video and data. Such devices would enable the users to access multimedia applications on the global network. Audio, video and data are considered as three generic forms of information in NEIS. Data includes all computer generated information such as text, computer graphics, computer animation, digitised pictures etc.

2.2.9: CONVERGENCE OBJECTIVES

Having discussed the goal of convergence in the context of NEIS, we are now in a position to enumerate a set of design objectives for convergence. The broad design objectives may be considered to be the folds as given below:

- To make every educational network and system be capable of handling the three generic forms of information, viz. Data, audio and video.
- To ensure every user access information in one or more of the generic forms.

In designing convergence systems, a number of specific objectives must be kept in mind. They include:

- User-friendliness
- Seamless
- Secure
- Privacy
- Portability
- Reliability
- Personal utility
- Professional productivity

The first and foremost of design objectives of convergence is user-friendliness. It must be simple and easy for an end user to access the networked world and work with any application. There shall not be a multitude of interfaces at the user premises. Elaborate connection procedures must be avoided. The procedure to establish a connection to an application must be simple and brief. The access must be seamless across networks without the user being aware of the intermediate networks that may be involved in establishing a connection There shall be no restriction placed on the user on account of network limitations. The user transaction must be secure on the network. User should not lose information or accidentally access information that belongs to someone else. If a user so desires, it must be possible to assure complete privacy for his transactions. People shift homes for a variety of reasons. A family's network-based activities should not be affected because of a shift in the physical location. Portability considerations address such issues. Reliability is a well-known consideration in networks. Failure of network segments or components should not affect user activities. Both personal utility and professional productivity must be enhanced on account of network-based life-style.

2.2.10: BASIC REQUIREMENTS OF CONVERGENCE

Fundamental to the process of convergence is the use of digital technology and digital techniques all over: digital computers, digital communication, digital information and so

on. Digital technology offers substantially higher information management capability than analog technology. Use of digital technology in every one of these functions results in superior performance. Digital infrastructure allows a variety of services to be integrated and supported on a common platform. Digital information is multimedia in nature, i.e. different forms of information such as text, audio and video are constituents of digital information. Digital technology ensures that any form of information can be transported and delivered in NEIS. Thus, digital technology is an essential ingredient of convergence.

Interworking and interoperability are two basic requirements of convergence. The two terms broadly mean the same thing; i.e. making any two non-identical entities co-operate and work together. The term interworking is used at the level of networks and systems. For example, how do we make an ATM network work with an Ethernet? How do the two operating systems, Linux and Windows co-operate with each other? Such are the issues addressed by interworking. The term interoperability is used at the level of devices and protocols. For example, how do we make an IP router work with a X.25 router? How do we make IPv4 protocol work with IPv6 protocol? Such are the issues addressed by interoperability. Standardisation is another basic requirement of convergence. It plays an important role in speeding up the process of convergence. Two international bodies under United Nations set out Standards related to NEIS:

- International Telecommunications Union (ITU)
- International Standards Organisation (ISO)

In addition to these two bodies, Internet related Standards are brought out by Internet Society. To a large extent, these bodies complement each other's work by concentrating on certain segments of standardisation. All the three bodies freely adopt one another's standard to enable users to follow any one set of standards. Each of these bodies has its own well laid-out procedure for evolving standards. ITU is located in Geneva, Switzerland with over 150 members. Any sovereign state that is a member of the United Nations may become a member of ITU. Sovereign states are represented by their respective governments and thus ITU is an inter-governmental organisation. Member governments, mostly represented by their respective telecommunications administration, are constituent members with a right to vote. Others, like network and service providers, manufacturers and scientific and industrial organisations also participate in ITU activities but with a lower legal status.

There are two sectors of ITU that deal with standards related to NEIS and convergence:

- Telecommunications standardisation sector (ITU-T)
- Radio communications sector (ITU-R)

2.2.11: CONVERGENCE FOCUS

There are three important aspects towards which convergence efforts may be directed:

- Connectivity
- Capacity
- Content

At present, less than one-sixth of the world population is connected to telecommunication infrastructure for some service or the other. Over five billion people in the world still have no network connectivity. The existing connection may be for a simple service like telephone, dial-up Internet access or a multitude of services offered by ISDN. Should the convergence efforts be directed towards increasing the connectivity level and thereby make a larger percentage of the world population as part of NEIS? Bringing in more people on the network has been considered important by major international organisations. In fact, ITU has suggested that every village in the world be brought on to the connectivity map by the end of year 2015 as part of its global multi-stakeholder initiative called Connect the World launched in June 2005.

Interactive services are likely to be dominating NEIS. Interactive services, restricted to text transfer like e-mail, information access and simple graphics transfer can be supported by limited bandwidth connections that exist today. The current information transfer rates are in the range of 64-128 kbps. The rates are proving to be inadequate even for the current level of usage. For example, Internet response for Web access at times becomes so slow that it made someone to expand the acronym WWW as World Wide Wait! Multimedia interactive services envisaged in NEIS demand transmission and distribution of high fidelity voice, high quality video, 3-D graphics and other forms of information. This calls for a broadband communication pipe supporting data rates of the order of 100 Mbps or more to be extended to customer premises. Broadband services have the potential of increasing the revenue earnings for the network operators as the users may be prepared to pay high charges for the services. Should then the convergence efforts be directed towards enhancing the capacity of the existing communication pipes instead of increasing the connectivity?

A network infrastructure without contents and applications to run on it is like 5-star hotels without guests to occupy them. The importance of content creation has been emphasised by many experts. For example, a CEO of a networking company once

remarked something to the following effect "We do not want to build dumb pipes. If we make only racks and servers, that is dumb. What we should do is to meld contents and networks" Norio Ohga, an ex-chairman of Sony once remarked "Without content, network is nothing". Yet the debate of content versus connectivity is hot. One of the main reasons for this is that the statistics show that consistently connectivity applications earn much more revenue than content delivery systems. In connectivity applications like telephone, the content is created by the end users. The highest revenue is earned from voice conversation in both landline and mobile networks. The other source of major revenue is the fax usage, which is again a connection-oriented service. Another pointer is a comparison between Small Messaging System (SMS) and Wireless Access Protocol (WAP) on the mobile networks. SMS is connectivity oriented where the content is created by the end user. WAP is a content delivery protocol for wireless devices. Statistics show that SMS is more widely used than WAP and brings in more revenue. On the Internet too, it is the e-mail which is the 'killer' application and not the wide area information system (WAIS). In fact, it appears that even historically the connectivity has been more important for people. For example, in the postal system the main revenue earner is the letter communication rather than the newspaper distribution. It appears that the people prefer to create their own content and all that they need is an efficient connectivity infrastructure that is affordable.

In the opinion of this author, all the three aspects, viz. connectivity, capacity and content are important. Small and medium network operators must concentrate on connectivity. Large operators must focus on capacity. Content creation must be left to end users and specialists like movie producers.

2.2.12: SECTORAL CONVERGENCE

At a very broad level, convergence efforts have to start with major infrastructural sectors. Five sectors have been identified as the core in realising a worldwide network society:

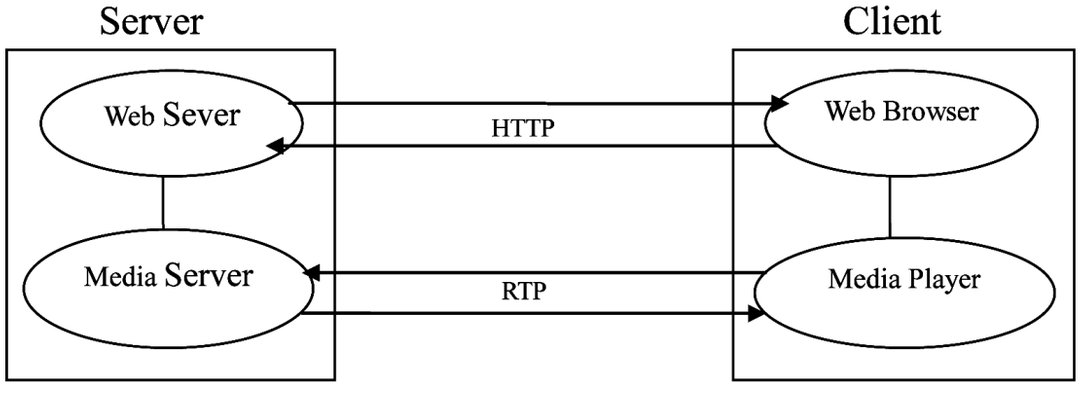
- Telecommunications Sector;
- Power Sector;
- Internet Sector;
- Computer Technology Sector;
- Media Sector.

2.2.13: TECHNOLOGY CONVERGENCE AND APPLICATIONS CONVERGENCE

There are four major communication systems that form part of modern telecommunications:

- Electrical communication system
- Optical communication system
- Radio or wireless communication system
- Satellite communication system

The four communication technologies complement each other to improve Connectivity and Capacity. Electrical communication uses copper cables of different types that have different information carrying capacities. Copper cables have been in use for a long time for establishing networks worldwide. Information carrying capacity of copper cables is being continuously improved and even today copper cable is favourite medium in communication systems. Optical fibres are replacing the copper wires in certain segments of telecommunications because of their extremely high information carrying capacity. However, laying copper or optical cables to every village, home and office in the world is a formidable task and it may take many centuries if this were to be achieved. The enormity of the task becomes clear when we realise that we have been able to connect via landline only about 15% of the world population in the last 120 years. Further, laying optical fibres is more difficult than laying copper cables because of special considerations required for optical fibres in bending and routing. With such constraints, large-scale connectivity cannot be achieved in a short time frame by using cables. However, only high speed copper cables and optical fibres can offer high bandwidths. The bandwidth capacity of optical fibres is, of course, orders of magnitude higher than that of copper cables.



2.2.14: LET US SUM UP

Communication can be classified in different ways. It can be classified as verbal and non-verbal communication, vertical, horizontal communication, oral, written communication individual and group communication. There are also some certain strategies to make communication effective and teacher's role in classroom communication. A teacher can use more than one media in a particular situation-then it can say that the teacher uses multimedia. Multimedia is very effective in teaching-learning process due to different reasons. And therefore the application of multimedia is increasing day by day in the field of education. The convergence aspects in the context of NEIS have been discussed. The Unit places convergence in perspective by explaining what convergence is. The goal and objectives of convergence are then outlined. The basic requirements of convergence including standardisation are then highlighted. Three important issues, viz. connectivity, capacity and content on which convergence efforts must focus are discussed. The convergent phenomena in technology, network, switching, access and service areas are discussed in detail. At the end, how some important convergent applications are realised is discussed.

2.2.15: ASSIGNMENT

5. **Discuss Verbal and Non-Verbal Communication Process. Mention the differences between Verbal and Non-Verbal Communication Process.**
6. **Why communication is important in classroom situation? What should be the teacher's role in classroom communication?**
7. **What is the meaning of Multimedia? Why it is so popular in modern teaching-learning process?**
8. **What do you mean by Convergence? Describe some important convergent applications in Educational Technology.**

2.2.16. SUGGESTED READINGS

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EDE-418

ADVANCED EDUCATIONAL TECHNOLOGY
(Elective)

BLOCK-3

Instructional Techniques in ET

Unit-I

Individualized Instructional Techniques

CONTENT STRUCTURE

3.1.1: INTRODUCTION

Individualized instruction techniques refer to educators using specific strategies, resources and assessments that cater to the needs of learners in their class. This process ensures that students are given guidance and flexibility in their learning process, enhancing their academic growth along the way. The teaching-learning system in general and the instructional systems design in particular. Various instructional techniques are an integral component of any instructional system. An instructional system is designed to achieve one or multiple objectives. These objectives are achieved through a combination of various methods/approaches/techniques which include the use of media. A combination of these techniques and materials employed to achieve a pre-stated objective, is what we call teaching learning strategies.

3.1.2: OBJECTIVES

By the end of this unit you will be able-

- To understand the meaning and concepts of Instructional Techniques;
- To plan and set the Instructional objectives;
- To select and organize Instructional Material, Media & Methods and proper Instructional Environment;
- To explain different individualized learning techniques of instruction.

3.1.3: MEANING AND CONCEPTS OF INSTRUCTIONAL TECHNIQUES

As the name suggests, this kind of educational technology is meant for helping the instructor and the learner in the desired instructional task for the realization of the stipulated instructional objectives in a particular teaching-learning situation. In simple words, it is a type of technology meant for bringing improvement in the instructional process. Here, the term instruction stands for a certain type of command meant for getting some specific information, knowledge and understanding about a thing, system or process. The type of technology which may help the learner and the instructor (or the self-instructional packages) in this task may be termed as instructional technology. Instructional technology, in this way, first try to plan what type of instruction and instructional material are needed in a particular

teaching- learning situation and then suggests way and means for the utilization of this instructional material for the proper realization of the instructional objectives. Instructional technology, in this sense, must be regarded as a subsystem of educational technology that is purely concerned with the process of imparting instructions to the learner for realizing the stipulated instructional objectives which is mostly cognitive (development of knowledge and understanding) in nature. The conative as well as affective domains of the learner's behaviour are thus almost neglected in the services provided by instructional technology. With the provision of self- instructional material through programmed instructional packages, teaching machines and computer-assisted learning, this type of technology makes the learner quite independent in his learning task. He is no more in need of tutor or teacher for carrying out the instructional work and realizing the teaching learning objectives. The learning task, with the help of essential services provided by the instructional technology, thus becomes quite simple, systematic and interesting according to the learners needs, abilities and pace of learning. Understood in this way, instructional technology may be defined as a subsystem of educational technology which helps the instructor or the learner himself as a part of his self learning or auto instruction by determining the media, methods and material for the realization of the stipulated instructional objectives in a given teaching-learning situation.
Let us visualize how does instructional technology helps the instructor and learner in the task of instruction and learning in a particular teaching-learning situation.

Setting of Instructional Objectives

Instructional objectives make the very core and heart of any instructional techniques. Whatever piece of instruction is planned, it needs the planning and setting of instructional objectives in the very beginning. Type of behavioural changes are to be are expected after going through that piece of instruction to the learner is thus to be decided and set before proceeding further in the task of imparting instruction. Instructional technology may help the instructor and learner to take decision about the instructional techniques and learning objectives in close cooperation of the following:

- The age and cognitive level of the learner.
- The physical, social and emotional potential of the learner.
- The previous knowledge of the learner related to the subject and topic.
- The learning resources available for imparting instruction.

Instructional objectives for a particular piece of instruction to a particular group of learners in the available teaching-learning situation, help may be taken from the

knowledge and skills imparted by instruction techniqus available through its content material such as:

- Taxonomy of instructional objectives in the cognitive domain and affective domain (provided by Bloom and his associates) and for the psychomotor domain (provided by Simpson as well as Harrow).
- Writing the instructional objectives in behavioural terms by taking the help of Robert Mager's approach, Robet Miller's approach or RCEM approach.

Taking decision about the instructional material

The instructional objectives, type of learning experiences should be provided to the learner needs to be decided at this stage. We have to select the teaching-learning experiences and then organize and integrate them properly for utilizing in the course of instruction. The instructional material is then divided into properly related and sequenced units by following the principles of simple to complex, specific to general, theory to practice, etc. All such decisions about the selection and organization of the instructional material, for carrying out the task of instruction in view of the realization and stipulated instructional techniques, are always facilitated by the knowledge and skills provided by instructional techniques. In the case of auto-instruction, like programmed instruction, computer-assisted instruction, and teaching machines, the instructional material is well available in the form of well-arranged, sequenced form suiting the abilities, needs and requirement of the learners for learning at their own pace. The availability of such auto-instructional material has been possible only through the knowledge and skills provided by instructional technology.

Taking decision about the media and methods

Instructional techniques may help the teacher and also the learners to select and make use of appropriate media and methods for carrying out the teaching-learning process. For this purpose, it brings into light the following facts:

There are varieties of media and methods available for imparting instruction techniques. No single media or method is suitable for all types of instruction or a particular type of instruction in all teaching-learning situations. Teacher has to take proper decision about the selection of a particular media and method or a combination of media and methods depending upon the nature of the piece of instruction and resources and environment available in a particular teaching-learning situation.

Learner should have a proper knowledge and skill for the use and application of a particular media and method for carrying out the work of instruction or auto-instruction. Instructional techniques may help the teachers and students a lot in this direction by opening the gates of knowledge and skill that it can impart through its theoretical contents and practical application. For this purpose, it contains the topics like the following in its prescribed courses:

- Instructional techniques like lecture strategy, demonstration strategy, tutorial strategy, narration strategy, description strategy, explaining strategy, illustration strategy, role playing strategy, gaming strategy, group discussion strategy, question-answer strategy, discovery of heuristic strategy, problem solving strategy, excursion strategy, assignment strategy, brainstorming strategy, etc.
- Special instructional techniques for carrying out auto-instruction or self-learning like programmed instruction, instruction carried out with the help of teaching machines, computer-assisted instruction, personalized system of instruction (PSI), learner controlled instruction (LCI) etc.
- Cooperative or group instructional techniques like working on a project, living and learning in a community, team teaching etc.
- Knowledge and application of various types of audio- visual aids and instructional material such as radio, television, tape recorder, projectors, charts, maps, diagrams and models.

Taking decision about the proper instructional environment

Instructional techniques make one aware or conscious of the need, selection and organization of a suitable instructional environment. It clearly emphasizes that a particular type of environment is essential for carrying out particular type of instruction, and it then helps the teacher as well as learner for the organization of that type of instructional environment.

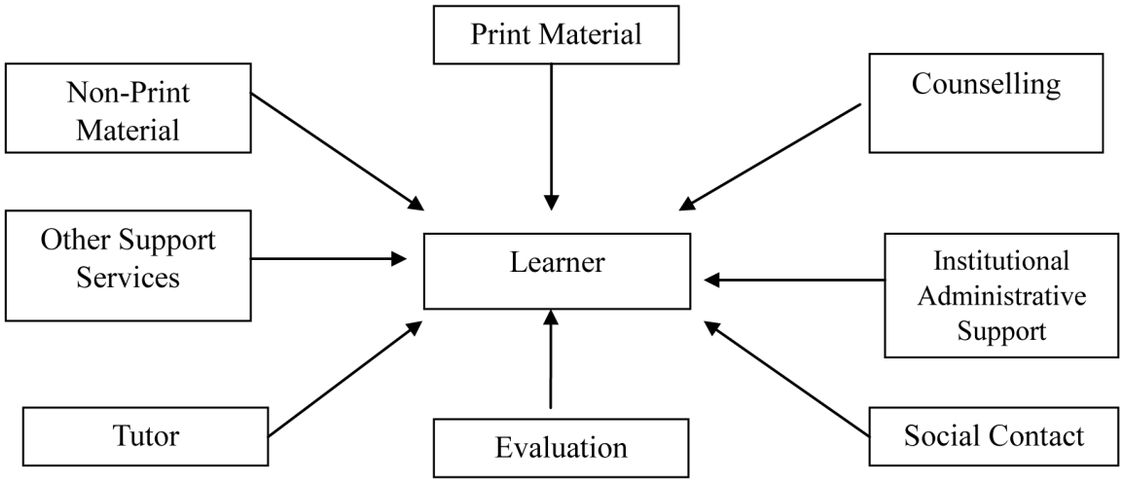
Helping in the task of evaluation

Evaluation is the real key and controlling agency of any type of instructional activity by the teacher or learner in the shape of auto-instruction. How far a teacher or learner has been successful in realizing the stipulated instructional techniques can be made known only through a well-planned strategy of evaluation. The course of instructional techniques contains the topics or contents which help the teachers to get acquainted with the strategies and material. Such topics or contents are: teacher-made tests, standardized tests, construction

of the achievement tests, evaluating the cognitive, effective and psychomotor changes in pupil's behaviour through suitable tests and techniques, self-evaluation tests, strategies and techniques. In this way, instructional techniques helps the teacher as well as the learners engaged in the task of carrying out a particular piece of instruction from the very beginning till the end for the realization of the stipulated instructional objectives.

3.1.4: LEARNER- CENTERED INSTRUCTION

In the instructional techniques, the learner plays the pivotal role in the teaching-learning process. Following figure is a diagrammatic representation of the instructional system underlying the learner-cantered approach to Teaching-Learning.



Learner-Centred Instructional System

In a learner-centred system the focus is on the individual learner, and the various system components are geared to help the learner to achieve his/her learning objectives. In this sense, learning becomes a completely individualized affair. However, this individualization varies from one learning situation to another. The situation of a student facing a learner-centered approach in a conventional system is very different from that of a student in a situation, through classroom attendance is not regular, the learner may use individualized learning facilities provided within and outside the instruction whenever he/she needs them. These teaching-learning systems operated to meet the needs of those learners who cannot attend regular classes because of various social or academic reasons. The learners in this system receive self-instructional print and non-print materials. Besides, they get tutorial/ counseling facilities either at the local study centers or through correspondence, or both.

Having acquainted ourselves with the learner- centred system in general we shall now discuss the following important specific learner-centred teaching-learning techniques:

- Personalized system of instruction;
- Flexi-study;
- Distance learning;
- Programmed learning;
- Computer-assisted learning and
- Individual project.

3.1.5: PERSONALISED SYSTEM OF INSTRUCTION

In this system, instruction is individualized. Let us take one particular example and discuss it.

F.S. Keller, in the late 1960s, in the United States, developed a personalized system of instruction, called the Keller plan. In this plan, the course materials consist of a number of small chunks of information called units. Each unit has its own learning objectives and the learner is supplied with a study guide that suggests a number of means to achieve the stipulated unit-objectives. The units supplied to the learner are necessarily self-instructional in nature. Besides these, the learner uses the text books and supplementary notes suggested in the study guide. A course unit may contain preset assignments; work on exercises, slides and models that help the learner to proceed smoothly through the course. Course tutors are attached to learners who can contact them whenever necessary and discuss any problem encountered in the units. To complete one unit, an average learner has to put in roughly one week's time; and variations are allowed for different types of learners with a varied pace of learning.

The learner works through the course-units one by one, and depending on his/ her convenience he/she sits with the tutor for purposes of clarification. When it is felt that the learner has achieved the learning objectives of a particular unit, he/she requests a test that examines his/her mastery of the unit. It is important to note that the learner can proceed to the next unit only when he/she is declared qualified at a stipulated level. In the Keller Plan, mastery learning is stressed, so a learner has to achieve eighty to ninety percent marks to pass the test and move on to the next unit.

Besides the self-instructional units, the study guide and the tutor, a learner may also listen to lectures specially meant to introduce the course, etc., and conduct laboratory experiments, if the course requires them. However, essentially the Personalised System of Instruction (PSI) is based on the principles of independent study, individualized learning and self-pacing.

The Keller Plan has been modified many times since its formulation. The modifications are in the areas of test-scheme, peer-group teaching, etc. This system of personalizes and independent learning has proved useful in the USA in medical and science subjects at the higher education level.

3.1.6: FLEXI- STUDY

Flexi- Study is a local-specific system of learning, which is another important and popular student-centered technique of instruction. This combines both correspondence and tutorial support in a local college/instruction. A learner takes on the individualized learning materials through correspondence and attends the tutorial/counselling sessions in the local college/institution as and when required depending on his/her convenience. Besides the correspondence and tutorial support, the local institution provides a range of resources, viz., Language Laboratory, learning resources centers, non-print media, library facilities and other administrative support. The learners sit for examinations when they feel they are ready to do so. This type of individualized study is especially practiced in the United Kingdom in areas of 'Community Adult Education' and 'Further Education'. Open learning programmes are effectively designed and used o meet the special educational and training needs of those who reside in remote areas in the countryside. Because of various socio-academic and political-economic reasons these potential learners are unable to attend formal educational institutions. (Such learners are found in different settings in all countries.) Therefore, the curriculum that goes into the learner-centered educational programmes is designed in such a way as to suit the needs of a particular locality. Usually, either an industrial firm or a local educational institution is given the tasks of curriculum development, administrative provision and the provision for tutorial and other facilities. These tasks are supervised and coordinated by a Central Unit. This method of self-study in a locality largely meets the needs of continuing and recurrent education and training. The learner is more free to proceed in the learning continuum and to achieve the individual learning objectives.

3.1.7. DISTANCE LEARNING

Those who have gone through the Post Graduate Diploma programme in Distance Education and/or other courses through the distance mode can reflect on the entire experience and recognize the essentially learner-centred nature of the programme which supports individualized study. In the early stages of correspondence education only print materials were used, but distance education has benefitted from technological growth and now utilizes multi-media learning strategies. The use of the multi-media approach enables the system to provide as much support as possible even to isolated distance learners. The self-instructional print and non print materials coupled with two-way communication through assignments, letters and other means like the telephone and synchronous media communications, help effect individualized learning. Though most of the learning transactions take place at a distance, local study-centre facilities are available to some extent through which extra support is given to the learners. In essence, every attempt is made to remove or reduce the barriers to learning, and to provide possible extra support to the learner who mainly studies through self-instructional print materials. In distance education therefore a learner:

- Studies the specially designed self-instructional materials;
- Proceeds at his/her own pace;
- May attend the local study centre for tutoring, counseling, library facilities and audio video programmes;
- Submits assignments for evaluation and tutor comments that clarify some of his/her doubts or for establishing an academic rapport, breaking isolation and providing motivation; and
- Take an examination when he/she is confident of having mastered the content.

The courses in distance education are usually modular in nature. A learner obviously than proceed through the different modules. (It is possible that examinations may not be made mandatory for the claiming of a diploma/degree, particularly in the case of self-enrichment programmes where a learner goes through the course without aiming at any kind of certification.) Large scale innovations have provided opportunities to the socially disadvantaged population to further their access to higher education.

3.1.8. PROGRAMMED LEARNING

The term ‘programmed learning’ refers to a procedure of self-instruction which uses an instructional sequence in which the content to be learned is presented in a series of small

steps, arranged in a logical sequence. The onus of learning, however, is completely on the learner. To facilitate self-learning, programmed instruction materials are designed so as to give various kinds of intellectual, emotional and psycho-motor experiences to the learner in a controlled situation through a variety of devices like booklets, machines, teacher, etc. Based on his principles of 'operant conditioning', Skinner developed teaching machine to affect learning. The text material that accompanies the teaching machine is known as programmed instruction. And it has become a part of the new instructional technology for learning. It has been on e of the most popular and effective innovations for individualized and assures learning, due to the following reasons:

i. The content is broken into small consumable information chunks making it easily accessible to the learner. Each of these chunks of information is called a 'frame'. The trainer is required to go frame by frame, depending on his/her performance on the objective-type questions tagged onto each of the frames.

ii. For each of the questions asked feedback is given. (This enables the learner to cross-check and self-evaluates his/her performance.) This information about the result helps the learner to proceed to further learning activity. If his/her answer is correct, the learner is motivated and feels satisfied. If the answer is wrong, he/she is directed to read the text or a part of it again.

iii. Programming demands the active participation of the learner in the learning activity. Naturally, this helps the learner sustain his/her motivation.

iv. Programming provides, by and large, an opportunity for individualized learning and self spacing. This principle is based on the fact that every learner is different from the other and his unique capabilities and requirements.

v. Continuous monitoring of learner-performance/progress is available. Testing is carried out in the light of the weaknesses of both the programmes and the learners.

Types of Programmes

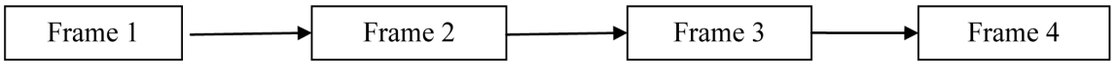
The two types of programming are:

i. Linear Programming; and

ii. Branching Programming.

i. Linear Programming: In linear programming, all the learners read and respond to the same frames. The sequence is linear in that there is a single path for all the learners

to follow. The learner is bound to proceed from one frame to another sequentially and to complete the programme.



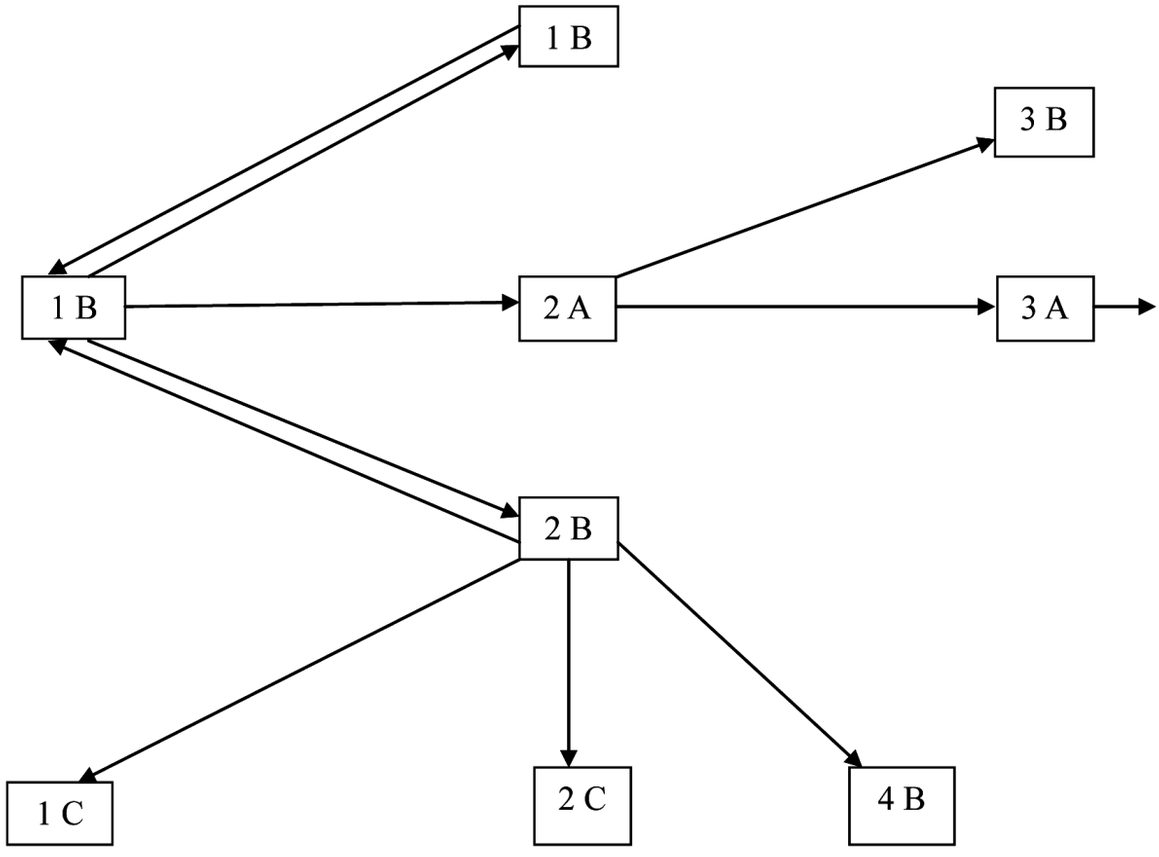
Linear Programming

As a rule, the content is presented in a logical sequence, proceeding from the simple to the complex. One questions, is put after each frame or after each level of difficulty. The learner responds to each question and proceeds till he/she achieves the pre-specified instructional objectives. The content is so arranged that the learner gets the right amount of practice at each level before he/she encounters the more difficult and abstract content. Obviously, therefore, in linear programming, the selection and repetition of questions, and the criteria of shifting the difficulty level are the important parameters we have to keep in mind while presenting content in a linear sequence.

One of the important characteristics of linear programming is the appropriate use of 'prompts' to elicit the correct or required responses from the learner. The 'prompts' are supplementary stimuli, hints or assistance that helps the learner comes up with the correct answer(s). The 'prompts', however do not tell him/her the answer, and are gradually weaned away as the learner progresses to the level where he/she is able to respond correctly without their help. Nevertheless, the supply of ''prompts' is increased or 'restricted according to the requirement of the learner'.

It should now be clear to us that one of the important reasons for using prompts in linear programming is to eliminate the learner's errors. Despite the prompts provided, if the learner does not answer correctly, the programme is considered to faulty and the difficulty level is such to be incorrectly selected. In such cases corrective measures are taken.

ii. **Branching Programming:** As the term itself indicates, a branching programme provides more than one path to follow. Like the linear programming, if the learner responds to all the questions correctly, he/she proceeds from one step to another with any interruption. On the other hand, if the learner makes an error or answers wrongly,' he/she is directed to follow another path known as the supplementary path which gives him/her remedial instruction.



Branching Programming

Above figure indicates, the learner begins with frame 1A. He/she reads the information presented in the frame and answers the multiple-choice questions. The instructions provided in the frame will tell him/her what has to be done next.

If the learner's answers are correct, he/she will proceed on to the next frame i.e., 2A in the figure given. Supposing the answers are incorrect, the remedial frames (i.e., 1B or 2B in the figure), have to be studied again. Depending on the instructions in frame 1B or 2B the learner will return to frame IA, and begin afresh. The learner will carry out this kind of activity from frame to frame until the predetermined objectives are met. It is essential here that we see the difference between 'linear' and 'branching' programming. From Figs. 2.2 and 2.3., we can easily deduce that branching programming presents much more information at each step. This is so because its frames are longer and each of them will comprise three or four paragraphs of moderate length. Besides, what is important is that the branching model allows errors in order to use them as building-blocks in the process of learning.

In 'branching' programming, the learners are expected to answer, at the end of each frame, multiple-choice questions. In other words, they choose from among the given alternatives. The process of answering the given alternatives is, in effect, one of selection. On selecting the correct response, the learners are presented with additional information. If they have not got the correct answer they are directed to go to the remedial material which explains why they are wrong. In a linear programme, on the contrary, the students supply the answer i.e., they supply a missing phrase, word, etc. The 'branching programme', therefore, has an edge over the 'linear' one, particularly in the context of remedial instruction, since it allows for individual differences, and does not force the weaker learner's pace nor does it oblige the bright learner to slow down his/her pace.

'Branching' is a research-based improvement over the 'linear' programme. In fact, they are based on two different lines of thought. The former is based on the art of teaching and the latter on the science of learning. The conclusion is that we should not be missed into thinking that the 'branching' programme is better than the 'linear' one. They should be accepted as two different approaches to the production of materials. In short, we need to combine the best of both.

3.1.9. COMPUTER-ASSISTED LEARNING

The developments in information technology have already affected the field of education both inside and outside the classroom. The computer, as an important information device, has not only extended the role of the teacher but has also individualized learning and increased learner freedom.

The computer can store, process and retrieve information as and when required. In the process of learning, computer performs all these functions, and thereby helps an individual to be an independent learner. In computer-assisted learning (CAL), the computer helps a learner by indicating whether or not a response, given by him/her while interacting with it, is correct. If the answer is correct, the learner proceeds to the next step; if it is incorrect he/she is advised to redo the exercise. Besides this, it can make learning more individualized by taking into account the needs, characteristics, skills, aptitudes and pace of an individual learner. Instead of one-way communication in teacher-centred techniques, CAL provides two-way communication, and in the absence of a teacher stimulates lively interaction between the learner and the learning package. Such interaction mainly consists of monitoring of and providing feedback for individualized learning.

There can be many forms of CAL. However, here we shall discuss the following three important situations in which a computer can help a learner to learn:

- A computer is installed outside the classroom, while a single terminal electronic typewriter is placed inside the classroom that has direct access to the computer. The teacher encourages students to develop their own computer programmes through the typewriter. Those students who are above average might be asked to interact with the peers and help them develop their own programmes.
- A full package, consisting of a course, or a course unit, is presented to the learner through the computer. It keeps every record of the learner and guides him/her by providing various exercises and drills, besides some remedial programmes for the slow learners. In each of these cases, a teacher can get any required information about the progress and performance of a learner from the computer.
- A computer is used to provide simulated learning situation to the learners. Parts of the learning materials which are beyond the immediate understanding of the learners (for example complicated, futuristic projections) can be submitted with the aid of a computer. This provides a greater measure of clarity and motivation to the learner.

Unlike classroom learning, a learner gets sufficient freedom to interact with the computer and learn on his/her own. He/she can proceed at his/her own pace, and at every step feedback is provided by the computer through interactive terminals that motivate the learners to interact and to learn more from the computer. In other words, the 'passivity' in lecture situations which we are familiar is eliminated, since a learner remains active throughout the learning process. The learner is never discouraged, because the computer never gets irritated. The learner's progress is monitored from time to time by the computer, and it decided upon and suggests modifications in the design of learning for individual learners if and when these are needed. The success or effectiveness of the use of the computer primarily depends upon the type and quality of the learning package fed into it. A good learning package, besides providing a higher level of learning, should also sustain the motivation and interest of the learners. Ideally, CAL should be integrated with the entire course, and its role should be made explicit to the learners at the beginning. This would certainly help avoid any possible confusion in the use of the computer among the learners. The feasibility of CAL and CML etc. has to take into consideration the socio-economic requirements (like need for expensive hardware) etc for small groups of learners. However, the point to be emphasized here is that the computer is being used for individualized learning.

3.1.10: INDIVIDUAL PROJECT

A project is a unit of activity course, the theoretical perspectives of which have already been taught or learnt in or outside the classroom. It usually aims at particular level of understanding. The leaner may either initiate a project or choose from pre listed projects and carry out the investigation that commonly results a thesis/ dissertation/ model/ report/ programme, etc. The teacher plays an advisory role in the project work, usually helping the learners proceed at their own Dace. However, unlike in the case of an exercise, the teacher has only a limited control over the outcome of the project work. In the case of an individual project, the learner is allowed the freedom to choose a topic /unit of activity to work on, and this freedom of choice ensure learner- commitment to the project. Besides, decision-making is the responsibility of the learner right from the beginning.

The steps an individual project work would include are:

- perception of a problem;
- consulting relevant literature and defining the problem;
- preparation of a design in investigate thus problem:
- selection, collection and retrieval of data relevant to the problem;
- data analysis and finding solutions;
- testing the finding solutions at each stage of data analysis;
- incorporating the feedback collected from testing; and

3.1.11: LET US SUM UP

Instructional techniques try to plan type of instruction and instructional material are needed in a particular teaching- learning situation and then suggests way and means for the utilization of this instructional material for the proper realization of the instructional objectives. Instructional objectives make the very core and heart of any instructional process. Instructional techniques may help the teacher and also the learners to select and make use of appropriate media and methods for carrying out the teaching-learning process. Instructional technology makes one aware or conscious of the need, selection and organization of a suitable instructional environment also. F.S. Keller, in the late 1960s, in the United States, developed a personalized system of instruction, called the Keller plan. In this plan, the course

materials consist of a number of small chunks of information called units. Flexi- Study is a local-specific system of learning, which is another important and popular student-centred technique of instruction. In 1954 B.F. Skinner proposed an Instructional design called as programmed learning. There are basically two types of programmed learning e.g., linear and branching programming. Each type has some special features. Linear frames are small and contain constructed responses and sometimes cues. On the other hand, branching programming consists of larger frame and uses remedial frames for correct the misconceptions. Both types have advantages and limitations. In computer-assisted learning (CAL), the computer helps a learner by indicating whether or not a response, given by him/her while interacting with it, is correct.

3.1.12: ASSIGNMENT

1. What do you mean by Instructional Techniques? What are instructional objectives? Mention some instructional materials.
2. What do you mean by Flexi Study? What is CAL?
3. What is Individual Project? Discuss different stages of Individual Project.
4. Describe the characteristics, advantages and limitations of linear and branching programming.
5. Compare linear and branching programmed instruction.

3.1.13. SUGGESTED READINGS

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EDE-418

ADVANCED EDUCATIONAL TECHNOLOGY
(Elective)

BLOCK-3

Instructional Techniques in ET

Unit-II

Group and Mass Instructional Techniques

CONTENT STRUCTURE

3.1.1: INTRODUCTION

Group instructional techniques are more suitable than individualized learning techniques for achieving objectives concerned for the development of interpersonal skills, problem-solving skills, oral communication skills and critical thinking skills, etc. Group instruction and development of group based skills are very vital in group learning, and therefore external factors like group size, seating arrangements, the layout of the room environment, etc., influence the effectiveness of such techniques a great deal. Each group may consist of more then two learners for effective group interaction. Mass instructional techniques are intended to educate more people and to improve the overall effectiveness of the teaching process. It helps in reaching many people at the same time. These techniques are used to teach a large number of learners effectively. The advantages of using mass instructional techniques are to improve the overall effectiveness of the teaching-learning process, to reach many people at the same time; and to teach a large group of learners effectively.

3.1.2: OBJECTIVES

After careful study of this unit you will be able-

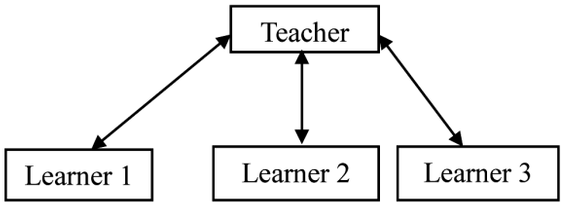
- To understand the meaning and concepts of Group Instructional Techniques;
- To suggest some guidelines for effective implementation of different group instructional strategy viz. Tutorial, Seminar, Group Discussion and Group Project;
- To differentiate and compare the above mentioned strategies;
- To explain the meaning and concept of Mass Instruction Techniques ;
- To identify the benefits of mass instructional techniques;
- To describe the role of Lecture Method, Simulation Technique and Demonstration Method as mass instructional techniques;

- To elaborate the role of Brainstorming, Role Play, Video and Film Presentation, Drills and Practices and Question-Answer as techniques of mass instruction.

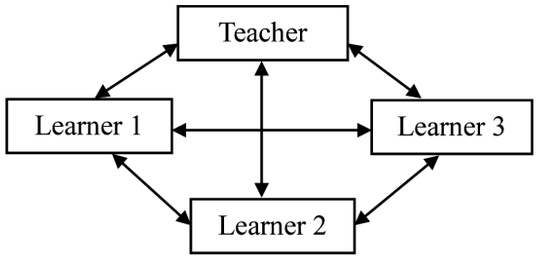
3.2.3: MEANING AND CONCEPTS OF GROUP INSTRUCTIONAL TECHNIQUES

The individualized learning techniques facilitate learning in an academically isolated and independent individual, under the group learning techniques, care is taken to stimulate group discussions and other activities within a group to achieve the stipulated educational objectives. Group learning techniques are more suitable than individualized learning techniques for achieving objectives concerned with the development of interpersonal skills, problem-solving skills, oral communication skills, critical thinking skills, etc. Group interaction and development of group based skills are very vital in group learning, and therefore external factors like group size, seating arrangements, the layout of the room, etc., influence the effectiveness of such techniques a great deal. Each group may consist of (at the most) 10 learners for effective group interaction.

We can organize group interaction in varied ways. We have presented two such models of organization below:



Group Discussion:



Group Discussion:

Group 'dynamics' in the two situations of group learning are different from each other. Situation 1 represents a group learning where the discussion and group interaction are controlled by the teacher. In this situation, dialogue is effected between the teacher and the students. There does not exist any interaction between the students, and therefore the pattern of communication seems to be very limited. As per situation 2 the group learning depicted represents a different kind of communication pattern in which all the students in the small group interact not only with the teacher, but also with one another and the group as a whole controls the discussion and group interaction. While in the former situation (Situation 1) the teacher has to be active throughout the discussion/group interaction, in the latter situation (Situation 2) the degree of teacher-participation after initiating the discussion will be relatively

less. However, in both situation, the teacher plans and structures learning experiences in order to effect learning in a group.If the teacher predetermines the organization of the group and the pattern of discussion, the group learning situation is called a structured situation. In certain group learning situations the group activities may not be structured and pre- planned, and so the students are free to adopt any pattern of group discussion or interaction. Though in the former situation it is possible to predict the learning outcomes, in the latter situation it becomes very difficult to do so.

3.2.4: TUTORIAL

The tutorial is an extended classroom, and so far as the group size is concerned it may be called a classroom in miniature. Tutorials provide students with a chance to express their individual learning difficulties and help the teachers to pay attention to each learner individually. The teacher selects the topic and puts it forth for discussion in the group. Besides, the whole organization of the leaning situation is predetermined by the teacher. Thought the teacher controls the group interaction and discussion, much depends upon the students behave and interact with the teacher.

3.2.5: SEMINAR

. Group discussion allows frequent and multiple ways of interaction among the students in the group, and learning is controlled by the group rather than the teacher. The techniques used in the seminar may differ from subject to subject and from one level of education to another.

In a seminar, occasionally one of the students of the group presents a written essay or a talk. The contents of the presentation are discussed by the group within the frame of their predetermined learning transactions.

The teacher keeps his/her dominance at a low key and allows more discussion and interaction among the members of the group. The student who presents the essay or the talk is encouraged to be more analytical and to evaluate the theme rather than be governed by the considerations of content coverage or correctness. However, discussion among all the students in the group is as important as the presentation of the topic by one student. In some situations, rather than being on the topic the stress will be on the ability to critically and analytically discuss the issues in the group.

In practice, there are many variations of the type of seminar discussed here. We may think of a situation where one small group of students sits around a table in a room and discuss a pre-determined topic or issue while another small group simply observes the group discussion. After the discussion is over, the group in the outer circle joins the group around the table to discuss and assess the discussion already carried out. This procedure contributes to the development of non-verbal communications skills and leadership behaviour among the members of the group. This is called the "fishbowl" technique, and is usually used for identifying various aspects of group dynamics.

3.2.6: GROUP DISCUSSION

In a controlled discussion the students are free to ask questions and contribute to the discussion through comments. Such discussions are used in the case of large groups, say, for instance, in exposition-based teaching sessions. After the session, a controlled discussion is carried out to provide feedback to the students. In a classroom situation, the teacher asks pre-planned questions of students to lead the entire group towards the pre-determined goal of learning by stages. In this situation the teacher has full control over the course of the students' discussions. This technique is usually used to reinforce the content of a course already taught through the formal classroom lecture.

3.2.7: GROUP PROJECT

The group project, a small group is assigned the task of selecting a problem and conducting a study on it. Every learner in the group interacts with the other, discusses the problem and contributes to its study in whatever way one can. While carrying out a group project work, skills for group work, group involvement and interaction, individual assertion within the group, group communication, and personal development within the group are given emphasis.

Group project work involves the following three stages:

- recognition of a task/unit of activity problem;
- definition of the problem and formulation of work design, and
- solution to the problem.

While solving the problem instead of an individual leaner the whole group is involved in the investigation. Therefore, decision-making is the responsibility of the entire group and it

needs group involvement, cooperation and commitment to succeed. Group project work may involve individual presentations and individually allotted tasks within the group, participation in group discussions, and the chaining of such sessions by each participant through a system of rotation. Since the outcome involves group responsibility, every learner in the group "has" to be committed to this collective responsibility. The supervisor, in this case the teacher in charge of a group, guides the group project work, provides consultancy, and helps the individual members in the group in effectively participate in the group activities including group discussions. Group project work develops the skills of argumentation, assertion, written and oral presentation/communication, organization, tolerance, cooperation and empathy. Further, the interaction in a group teaches the learner the basic principles behind adjustment in a societal framework. In other words, group project work at the level of higher education develops adult socialization.

3.2.8: MEANING AND CONCEPTS OF MASS INSTRUCTIONAL TECHNIQUES

The Mass instruction is in existence since the inception of the concept of education in the form of lecture and expository lesson as the most dominant instructional techniques. Through the use of mass instructional techniques, it was intended to educate more people without increasing the number of teachers, and to improve the overall effectiveness of the teaching process. It helps in reaching many people at the same time. These techniques are used to teach a large group of learners effectively. Our own classrooms are its examples where large number of students are given instruction and taught at the same time. Winston (2008) suggested that teachers need to realize that the nature of learner's changes with its size. So, teachers should plan and use mass instructional techniques that communicate with clarity and accuracy, use questioning and discussion, engage students in learning, provide feedback and are flexible and responsive. There are different mass instructional techniques, such as direct instruction, demonstration, lecture, exposition, explanation, discussion, role play, film presentation, educational broadcasting, etc.

3.2.9. LECTURE METHOD

Teacher-centered method, it generally involves one-way communication wherein a supposedly learned person explains the subject's complexities to a supposedly motivated audience. This method has been, and remains, so extensively used in conventional educational situations that its educational effectiveness has become very difficult to determine. Besides,

as the learners are quite used to this method of teaching and learning, any deviation from this method creates confusion and insecurity in them. One reason for its popularity in this conventional set up, perhaps, is that it can be used for quite a large number of students at a low cost. However, we should remember here that we are talking about its effectiveness.

A lecture could be made effective if it is structured/ organized in the following way:

- **Introduction:** The lecturer/teacher introduces the topic to the class by relating it to the previous knowledge of the learner. In order to kindle the curiosity of the learners and to sustain their motivation, he/she asks a few questions on the familiar topics relevant to the one being taken up. Depending on the class-requirement, the teacher can use charts, models, etc.
- **Presentation**: The teacher presents the subject matter acting as a medium between the syllabus and the students. He/she needs the following skills to present the subject matter effectively.
  - Dividing the subject matter into small manageable chunks of information and arranging them in a logical sequence. Depending on the class/topic requirements the teacher can use audio-visual media like the blackboard, maps, globe, charts, etc., accordingly in order to make the subject matter easily accessible to the students.
  - Motivating the learners and sustaining their motivation with the help of the audio-visual media, body language (posture, gestures), humour, etc.
- **Closing up:** Towards the end of the lecture, the teacher summarizes the whole lecture to help the students retain the contents. After providing a study guide to the learners and telling them how to go about their learning activities with reference to the particular topic taken up, the teacher may brief the students about the ensuing lecture.

3.2.10: SIMULATION TECHNIQUE

An attempt is making to expose simulation technique popularly used in face-to-face education. It has applications in distance education in the form of simulated communication in SIMs, and in tutoring and counselling. By simulation, is meant the replication of reality in order in make it easily accessible in the learner. In teaching learning situations, simulation techniques are used in order to make reality easily accessible to the learner. Thus, in simulated

situations, learners deal with simulated problems through action. That is to say, some learners, having identified the delineated problems play roles so as to simulate the situation, while others just observe the action. The essence of simulation is the involvement of participants (learners) and observers in a specially created situation.

The simulation technique, thus, provides a live sample of human behaviour which serves as a vehicle for learners to:

- explore their feelings;
- gain insight into their attitudes, values and perceptions;
- develop their problem solving skills: and
- explore the quality of the subject matter being discussed/analyzed.

These four possibilities indicate that simulation advocates an experience based learning situation. The enactment elicits genuine and typical emotional responses and behaviours from the learners, whereby learning becomes more effective and meaningful.

To make the process of learning through simulation effective, we should follow the stages given below:

- **Warming Up:** This stage involves the identification of the problem or the skill to he acquired, an explanation of the issues related to it and the explanation of role play.
- **Setting the Stage:** At this stage, the group should be motivated for active participation by explaining the significance of role play, etc.
- **Preparing the Observers:** This stage involves decisions about which observation tasks (like the kind of information/data) are to be recorded; the way the recorded data is to be presented, etc.
- **Role Play:** Once the stage is set, actual role play is conducted at this point.
- **Assessing the Event:** At this stage, the observers will review the event with the help of the predetermined procedure for evaluation. Naturally, the strong and weak points in the exercise will be discussed with a view to making the learners acquire the desired skills.
- **Re-Enactment:** On the basis of the observation and the assessment of the event a repeat version of role play, if needed, is arranged.
- **Review:** This stage involves reviewing the progress of the learners, highlighting the improvements, relating the simulated situation to real life experience and the principles of acquiring the required skills.

The learners play roles in turns and in the process; the desired learning objectives are achieved.

There can be many ways of simulating a real life situation, and they are based on models. Models can be at least of two types static and dynamic. A trainer describing the situation of the problems of a personnel manager in an industry with the help of charts and slides is an example of static model of simulation. On the other hand, in a dynamic model of simulation, the real-life simulation/problem is dramatized or presented in a lively way so that both the players and the participants learn about the real problem and its solutions.

The technique of simulation games is generally used in defense academies, management institutes or training programmes. Nevertheless, it need not be restricted to any one particular discipline. For example, this technique can be used for teaching/ learning English as a foreign language.

The steps through which students learn English are as follows:

- The teacher tells the students of a group that they are in visit Chennai where a majority of the people, including the business community understands English besides their mother tongue. So all the students should try their best to learn it to interact with them. With the help of students, the teacher arranges for the construction of temporary shops, offices, etc. around a small area within the premises of the institution.
- A few students are assigned the task of acting as shopkeepers and professionals, cloth merchants, grocers, stationers, tourist officers, bank managers, postmasters, railway ticket sellers, etc. They are provided with handouts in English containing information on bus routes, historical places, shops and commodities available, a railway station, post office, bank, etc.
- The other students are asked to collect information from these ‘shop keepers and ‘professionals’, etc. to prepare a proposal in English containing all the information necessary to undertake a journey to Chennai by the students of the entire school. The group, including the teacher, discusses them in English and each plane/proposal is rated by all. The best plan is selected.
- Each one prepares and presents an individual proposal.
- Through this kind of technique students should be taught written and spoken English and, perhaps, incidentally helped to acquire new vocabulary in the process.

- Similarly, learners can learn business games, risk-taking behaviours and allied skills; each learner gets a chance both to act in the game and to evaluate it. The learners are entirely free to act in their individual way but within the specified rules of the game.
- This gives the learner the opportunity of experiencing the situation in an individual style. This individualized experience demands expertise in designing the theoretical framework of the game to be practiced in a real situation.

For obvious that simulation technique should be:

- Provide greater opportunity to learners for active participation in the learning activities, make learning more interesting and permanent; and
- Promote the application of insights gained in a learning situation to real situations and thus help the leaner acquire the skill of decision making. This clearly reduces the dominance of the teacher.

It should be kept in mind that:

- we cannot use simulation techniques for all disciplines or in all situations;
- advance planning and preparation is imperative to derive optimum benefits from simulation.

3.2.11. DEMONSTRATION METHOD

Among mass instructional techniques, demonstration denotes the visual presentation of the action. It facilitates understanding of concepts, principles, theories, etc. in its proper form theoretically as well as practically. It is not a simple talk but includes the process of presenting the facts by showing how to do that through model performance. For example, teacher performs an experiment to show that metals expand under heat. When this technique is used, teachers do the things practically and give explanation along with the performance of the activity. Here, teachers plan, organize and execute the demonstration properly to make students understand the concepts clearly. The students' role is to observe, listen and follow the demonstration. It is helpful in cultivating their interest and attention and providing vivid and lasting impression on their mind. Students develop the skills of observation, questing, explaining and interring along with development of motor skills. It makes students active and develops their reasoning, deep thinking and creative imagination. It involves teaching by doing and gives opportunities for independent learning.

3.2.12: ROLE PLAY

Role play is a technique where a realistic situation is explored and dramatized by a group of students by playing different roles as desired by the situation under the direction of a teacher in order to derive rich and useful learning experiences. It represents "a spontaneous, unrehearsed life like presentation of some situation for gaining insight into a specific problem or deriving useful educational experiences" (Mangal & Mangal, 2017). It develops all three domains affective, cognitive and psychomotor.

3.2.13: BRAINSTORMING

This implies storming of brain to involve and generate free flow of ideas as quickly as possible without passing judgement and considering their validity and appropriateness. It was popularized by A. F. Osborn (1963) through his writing Applied Imagination. This technique can be used with a group of learners to explore a variety of ideas related to a situation or topic. It is mainly useful in "developing higher order thinking skills as reflective thinking, creative imagination and problem solving" (Mangal & Mangal, 2017). It encourages most of the learners to participate in teaching learning process.

3.2.14: VIDEO AND FILM PRESENTATION

It is the substitute of lecture method and face to face teaching. The most important aspect is that it can reach to the large audience with visual presentation that becomes long lasting and effective. This stimulating technique is helpful in illustrating the content and specific points to the large number of learners. It is expensive as compared to conventional techniques, It requires the infrastructural facilities and trained teachers for its effective usage.

3.2.15: DRILLLS AND PRACTICES

As an instructional technique, drill and practice is said to be one of the most important techniques used by teachers for fixing the concepts already learnt by students through systematic repetition of concepts and examples. It involves practice and revision of the learned materials which leads to mastery of the content and skill. It is a teacher-initiated and teacher-directed classroom practice and exercise work performed by the students, aiming

for the perfection of a skill or performance of the material to be retained in the memory of the students (Mangal & Mangal. 2017). It enables students "to proceed to more advanced learning without impairing their efficiency" (Kochhar, 1985).

3.2.16: QUESTION-ANSWER

Every teaching involves the use of question and answers. It is an art and skill of managing the task of putting questions and receiving answers to these questions (Mangal & Mangal, 2017). Questions are not necessarily to be asked by teachers, but in today's constructive classrooms, students can also pose questions concerning their doubts and queries. Through this technique, large number of students can be taught together and make them develop their understanding levels. Students become more active and interested if appropriate questions are asked in the classroom. It makes them ready for learning and motivates them for teaching learning process. It stimulates students to think reason and imagine from different perspectives regarding the topics being taught. A teacher can diagnose the learners' misconceptions, difficulties, strengths and weaknesses through effective use of this technique.

3.2.17: LET US SUM UP

Instruction is defined as procedures and activities planned for teaching. Instructional techniques are concerned with bringing improvement in the effectiveness and efficiency of learning in the educational context. Mass instructional techniques are intended to educate more people and to improve the overall effectiveness of the teaching process. It helps in reaching many people at the same time. These techniques are used to teach a large group of learners effectively and with efficiency. Group discussion needs proper planning and execution in order to reach the set goals of instruction. Tutorials provide students with a chance to express their individual learning difficulties and help the teachers to pay attention to each learner individually. Lecture can be defined as a planned scheme devised by teacher for presenting a unit of the content material to a group of learners through verbal communication which aims at attaining specific objectives related to the cognitive and affective domains of the behaviour. Through this technique, a teacher can provide facts, concepts, principles, theories, etc. to the class in a simple manner. Demonstration as a technique is helpful in cultivating students' interest and attention and providing vivid and lasting impression on their mind. Film presentation can reach to the large audience with visual presentation that becomes long lasting and effective. This stimulating technique is helpful in illustrating the content and specific points to the large number of learners. Drill and Practice technique involves practice

and revision of the learned materials which leads to mastery of the content and skill. It is a teacher-initiated and teacher-directed classroom practice and exercise work performed by the students. Selection of appropriate instructional strategy depend on many things some of them are teacher-centred and others are learner-centred. Learner centred strategy is more effective than teacher centred strategy. But teacher centred approach is used in many classroom situations. There are some guidelines for designing each strategy.

3.2.18: ASSIGNMENT

1. What is Group Instructional Techniques? Suggest strategies to make lecture method effective.
2. What do you mean by Mass Instructional Techniques? Mention different steps of Simulation Technique.
3. Explain group discussion method as a teaching strategy. Mention some points to make discussion method effective.
4. What are the different types of seminar? Describe the procedure of seminar method as a teaching strategy.
5. What do you mean by tutorial? Describe the procedure of group project.

3.2.19. SUGGESTED READINGS

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ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK-4

Integrating technology across the curriculum

Unit-1

Technology in Language instruction

CONTENT STRUCTURE

4.1.1: Introduction

Application of ET is wide spread. Technology is used in each and every subject. Integrating technology across the curriculum involves incorporating different digital tools, resources, and instructional strategies into different subject areas (such as language, science, social studies) and learning activities to improve the quality of teaching and learning inside and outside of the classroom. Applying technologies in classroom needs some pre-requisite principles or considerations. Some of them are given below:

Align with Learning Objectives: Technology must be align with learning objectives or outcomes of the specific subject.

Promote Active Learning: Application of technology in the curriculum should promote active learning among the learners, that promote experiential learning, problem-solving etc.

Cater diverse learners' need: Application of technology should be used in such a way so that it accommodates diverse learner needs and preferences.

Encourage Collaboration approach: The application of technology should facilitate collaboration and communication among all stakeholders (students, educators, and parents).

Provide Authentic Learning Experiences: Teachers must use technology to provide authentic learning experiences that connect classroom learning to real-world contexts and applications.

Facilitate Assessment and Feedback: Technology must be used to facilitate assessment and provide feedback on student progress and performance.

4.1.2: Objectives

After completion of the module the learner will be able to:

- Discuss the application of technology in language instruction
- Discuss the application of technology in science instruction
- Discuss the application of technology in social studies instruction

4.1.3: Technology in Language instruction

Most of technology applications can be used in Language teaching. Here we want to discuss some specific technology used mainly for language instruction:

Interactive storybook: An interactive storybook is a digital or physical book that allows readers to actively engage with the narrative. In digital interactive storybooks, this interactivity often takes the form of clickable elements, animations, sound effects, mini-games, or even branching storylines where readers make choices that affect the direction of the narrative. For example, readers might be able to choose the actions of the main character, solve puzzles to progress the story, or explore hidden surprises on each page. The goal of an interactive storybook is to encourage active participation of the learners at any level.

Digital storytelling: It is the practice of using digital tools and technologies to tell stories. It encompasses a wide range of multimedia elements, including text, images, audio, video, animations, and interactive features. Digital storytelling uses the capabilities of digital platforms and devices to engage learners in interactive experiences.Digital storytelling is frequently used for educational purposes, such as teaching, learning, and knowledge sharing.

Digital storytelling incorporates various forms of media, such as text, images, audio, and video, to convey narratives. It includes interactive features that allow audiences to engage with the narrative in meaningful ways. This digital storytelling offers accessibility benefits by providing alternative formats (such as subtitles) to accommodate diverse audiences, including those with disabilities or language barriers.

Blog writing: Blog writing is the practice of creating written content for a blog, which is a website or online platform where individuals or organizations publish regular posts on specific topics or interests. Blog writing is a versatile and accessible form of content creation that allows individuals to share their knowledge, expertise, and perspectives with a global audience.

Blog writing can play a significant role in language teaching by providing valuable opportunities for language practice, authentic communication, cultural exploration, and digital literacy development. Blog writing offers numerous benefits for language teaching by providing a platform for authentic language practice, cultural exploration, digital literacy development, and personalized learning experiences. Incorporating blog writing activities into language teaching can enhance learners' language skills.

Language Lab: The full form is "language laboratory,". It is a specialized facility or classroom equipped with audio-visual technology and software designed to support language learning and teaching. Language labs provide an interactive environment for students to practice listening, speaking, reading, and writing skills in a target language.

Language labs play a role in language teaching and learning by providing an interactive environment for students to practice and improve their language skills. Language lab serves as a resource in language education, offering students a supportive and interactive environment to develop their language skills, build confidence, and achieve proficiency in the target language.

Online Language Courses and Platforms: There are different online language learning platforms and courses that provide access to language learning materials anytime, anywhere, allowing learners to study at their own pace and convenience.

Language Learning Apps: Different apps have revolutionized language learning by providing access to language lessons, vocabulary practice, speaking exercises, and interactive games on smartphones

Online Language Exchange Platforms: Language exchange platforms connect learners with native speakers of the target language for language practice and cultural exchange by allowing learners to practice speaking and listening skills in authentic conversations with native speakers.

Computer-Assisted Language Learning (CALL): CALL refers to the use of computer technology to enhance language learning through software, interactive multimedia materials, and online resources.

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ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK- 4
Integrating technology across the curriculum

Unit-2
Technology in Science and Social studies instruction

4.2.1: Technology in Science instruction

The integration of technology in science teaching has changed the way of pedagogy in learning science concepts. Some means by which technology can be used in science teaching are given below:

Virtual Simulations and Virtual Labs: Technology enables the creation of virtual simulations and laboratory experiences that allow students to conduct experiments, explore scientific phenomena, and manipulate variables in a virtual environment. Virtual labs provide opportunities for hands-on learning without the need for physical lab equipment, making science more accessible and engaging for students.

Interactive Multimedia Resources: It helps to illustrate complex scientific concepts, processes, and phenomena. These resources engage students visually and kinaesthetically, facilitating deeper understanding and retention of scientific principles.

Data Collection and Analysis Tools: Different data logging devices, probe ware, and digital sensors help students to measure and record various parameters such as temperature, pH, light intensity, and motion, and enhance students' ability to conduct authentic scientific inquiry.

Modelling and Visualization Tools: It enables the creation of interactive models, 3D visualizations, that help students visualize abstract scientific concepts and phenomena.

Gamification: Gamified learning experiences and educational games provide interactive and engaging ways for students to learn and apply scientific concepts. Digital learners always prefer this type of learning through game.

Mobile Apps: Different mobile apps and digital tools offer portable and convenient resources for science learning and exploration.

Virtual manipulatives: These are digital tools or interactive simulations designed to mimic the functionality of traditional hands-on manipulatives such as blocks, counters, geometric shapes, number lines, and fraction bars, but in a digital format accessible through computers, tablets, or interactive whiteboards. It is especially used for mathematics teaching.

Interactive geometric software: It is also known as dynamic geometry software (DGS). It is a computer software designed to facilitate the exploration and visualization of geometric concepts in mathematics.

4.2.2: Technology in Social studies instruction

Technology plays an important role in teaching and learning of social science subjects by providing access to vast resources, facilitating interactive learning activities. Some of the technologies are discussed below:

Digital Mapping and Geographic Information Systems (GIS): This type of technology helps students to explore spatial relationships, analyze geographic data, and visualize patterns and trends in social science subjects such as geography, history, and economics.

Access to Online Resources: It provides access to online resources such as digital libraries, databases, research articles, and multimedia materials in social science subjects. It enables students to explore diverse perspectives on historical events, cultural phenomena, political issues, and societal trends.

Role-Playing Games: Different types of simulations, role-playing games, and historical re-enactments allow students to engage themselves in historical events, cultural contexts, and social scenarios relevant to social science subjects. It provides interactive and experiential learning experiences that helps in critical thinking.

Data Analysis Tools: It helps students to explore social science data sets, conduct statistical analysis, and create visual representations of datasets by using spreadsheet software, statistical packages, and data visualization tools.

Virtual Field Trips: Virtual field trips provides students the virtual experiences that complement classroom instruction in social science subjects such as history, geography, sociology etc. This type of virtual tours helps students to explore historical landmarks,

archaeological places, geographical sites from around the world, enriching their understanding of global cultures and historical contexts.

4.2.3: Let us Sum up

In this module we have discussed technologies which are helpful in instruction. There are three parts of this discussion. Firstly, we have discussed some specific technologies for language instruction, then we discussed the technologies in science teaching and finally technologies in social studies teaching and learning.

4.2.4: Assignment

1. Discuss the technology used in language instruction.
2. What are the different types of technology used in teaching science?
3. State different technological intervention applied in teaching learning process of social studies?
4. Explain CALL, Language lab, and Blog writing in the context of language instruction.
5. What is the meaning of 'virtual lab', 'gamification', 'virtual manipulatives' as instructional tools.

4.2.5: Suggested Readings

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ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK- 5
Pedagogy and Technology

Unit-1
Inter-relationship between Pedagogy, Technology and Digital Learner

CONTENT STRUCTURE

5.1.1: INTRODUCTION

Education, by its inherent nature, is a purposeful and collaborativeenterprise. This has been madeclear in the previous chapters.However, the interdependency of the educational community is notoften recognised or practised when it comes to leadership. One ofthe significant deficiencies of the higher education system is the lack ofsubstantive collaboration in establishing a vision,developing strategicaction plans and, most importantly, sustainably implementing these plans. Collaborative leadership instils commonpurpose, trust, and identification with the institution. These principles are associated with a community of inquiry relevantto higher education leadership. Planning for open communicationand reflective discourse, establishing community and purposefulinvestigations, and ensuring meaningful resolutions and applications formthe template for collaborative leadership. This goes well beyondcharisma and public persona. It means working hard behind thescenes to bring people together focused on meaningful change.

Higher educational institutions, unfortunately, have not shown a commitment to change that is inevitably disruptive. While information and communications technologies (ICT) are being adopted in the classroom, educational leaders have not yet fully grasped the profound significance of the impending changes. The appropriate set of principles must inform our vision. Regrettably, most leaders are not prepared to invest the necessary time to understand the paradigmatic shift upon us, particularly in the context of undergraduate education. We must ask ourselves: To what extent does senior leadership comprehend engaged inquiry approaches to learning and the transformative potential of information and communications technology in realizing the ideals of higher education? This is a critical point. We need to underscore the urgency of collaborative leadership required to bring highereducation into the connected knowledge age.

5.1.2: OBJECTIVES

By the end of this Unit, learners will have gained the following essential understandings -

- ❖ Conceptualise the idea of Techno-pedagogy.
- ❖ Understand the Techno pedagogical content knowledge (TPACK) model.
- ❖ Understand the Technology Integration Matrix (TIM) model.
- ❖ Explore the Characteristics of Digital Learner.

5.1.3: MEANING AND CONCEPT OF TECHNO-PEDAGOGY

Techno-pedagogy refers to integrating technology into pedagogical practices to enhance teaching and learning experiences. It involves the thoughtful and intentional use of technology tools and resources to support and facilitate educational goals and objectives. Techno-pedagogy recognises that technology has the potential to transform traditional teaching and learning methods by providing new opportunities for engagement, collaboration, and personalised learning. It goes beyond simply using technology as a substitute for conventional instructional methods; instead, itleverages technology to create innovative and compelling learning experiences. The critical elements of techno-pedagogy include a strong foundation in pedagogy, intentional integration of technology tools and resources, development of digital literacy skills, personalisation and differentiation, and the use of technology for assessment and feedback. Techno-pedagogy emphasisesusing technology to enhance teaching and learning experiences, promote active and engaged learning, and prepare students for the digital age.

5.1.4: THE TECHNO PEDAGOGICAL CONTENT KNOWLEDGE (TPACK)

TPACK, which stands for Technological Pedagogical Content Knowledge, is a framework that helps educators understand how to integrate technology into their teaching practice effectively. At the heart of the TPACK framework is the complex interplay of three primary forms of knowledge: content, pedagogy, and technology. The TPACK approach goes beyond seeing these three knowledge bases in isolation. TPACK also emphasises the new kinds of knowledge at the intersections, representing four more knowledge bases teachers apply to teach with technology. Pedagogical-content-knowledge, technological-content-knowledge, technological-pedagogical-knowledge, and the intersection of all three circles: technological-pedagogical-content–knowledge. It recognises that effective teaching requires a combination of expertise in three areas: content knowledge, pedagogical knowledge, and technological knowledge.

Content knowledge refers to the subject matter that educators teach. This includes a deep understanding of the concepts, theories, and skills relevant to the subject. Pedagogical knowledge, on the other hand, refers to the knowledge and skills related to teaching and learning. This includes understanding students' learning, different instructional strategies, and assessment techniques.

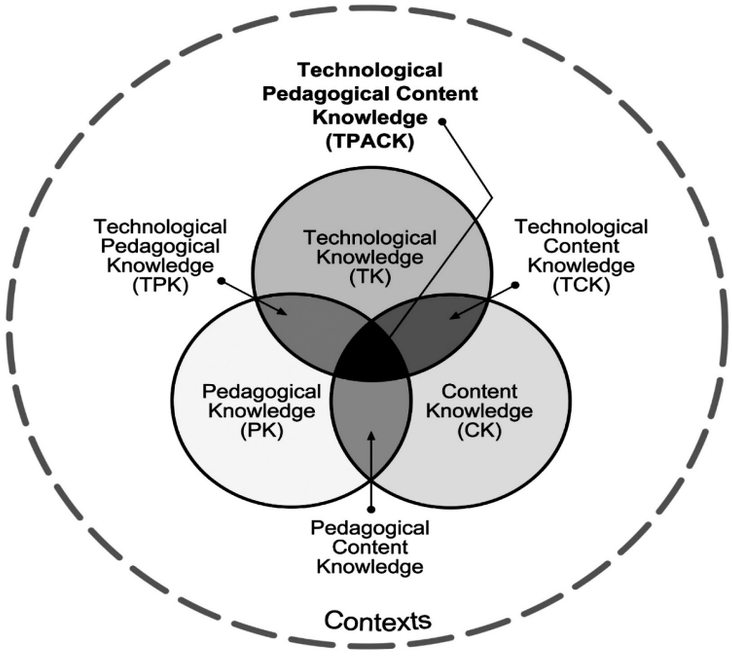
Technological knowledge refers to understanding how to use technology tools and resources effectively in the classroom. This includes knowledge of different types of technology, such as computers, tablets, and software applications, and how to integrate them into teaching and learning activities.

The TPACK framework recognises that these three areas of knowledge are interconnected and that effective teaching with technology requires a balance between them. The diagram below illustrates the relationship between content knowledge, pedagogical knowledge, and technological knowledge in the TPACK framework.

TPACK is about knowing these areas and understanding how they interact and influence each other. It emphasises the importance of integrating technology to enhance teaching and learning rather than using technology for the sake of using technology.

Educators can make informed decisions about effectively integrating technology into their teaching practice by considering the intersection of content, pedagogy, and technological knowledge. This may involve selecting appropriate technology tools and resources, designing technology-enhanced learning activities, and assessing the impact of technology on student learning.

The TPACK framework provides a comprehensive approach to understanding and implementing technology in education. It is a powerful tool that helps educators develop the knowledge and skills necessary to effectively integrate technology into their teaching practice, thereby enhancing student learning outcomes.



Source:https://educationaltechnology.net/technological-pedagogical-content-knowledge-tpack-framework/

This adaptability can be seen in the various intersections and relationships already embodied in the TPACK acronym.

Content Knowledge (CK) refers to teachers' content knowledge. CK includes subject-matter knowledge, field-specific best practices, and effective teaching methods. As a result, teachers' or students' CK may vary.

Pedagogical Knowledge (PK) refers to a teacher's knowledge of teaching and learning strategies, processes, and approaches. PK incorporates education's purposes, values, and goals as a generic form of knowledge and may relate to more specific fields such as student learning styles, classroom management skills, lesson planning, and assessments.

Technological Knowledge (TK): A teacher's ability to use various technologies, technological tools and related resources is technological knowledge (TK). Ensuring that teachers and students are continually learning and adapting to new technology offers is part of TK.

Pedagogical Content Knowledge (PCK)- This describes teachers' expertise in curriculum development, student evaluation, and reporting findings. Like CK, PCK focuses on fostering learning and tracing the connections between pedagogy and its supporting practices (curriculum, evaluation, etc.). In all circumstances, PCK attempts to improve teaching practices by strengthening connections between content and pedagogy.

Technological Content Knowledge (TCK)- refers to teachers' understanding of how technology and content interact. This includes understanding how various ed-tech tools communicate and are best suited for specific subjects or classrooms.

Technological Pedagogical Knowledge (TPK) describes teachers' understanding of how new pedagogical opportunities and constraints can change teaching and learning experiences. Another aspect of TPK is understanding how to use such tools alongside pedagogy in ways appropriate to the discipline and lesson development.

TPACK combines content, pedagogy, and technology to provide an adequate basis for teaching with educational technology. TPACK is the outcome of these diverse combinations and interests, drawing from content, pedagogy, and technology to create a practical foundation for teaching with educational technology. To effectively use the TPACK framework, teachers must be open to critical concepts such as:

Technology can represent concepts from the content being taught, and pedagogical techniques can communicate content in various ways. Different content concepts require students to possess multiple skills, and edtech can fulfil some of these requirements. Students

with various backgrounds enter the classroom, including prior educational experience and exposure.

The TPACK framework analyses the various types of knowledge necessary and how teachers might grow this knowledge.With the TPACK framework, teachers can overcome many problems while implementing educational technology (ed-tech) in their classrooms. The TPACK framework distinguishes between content (what is being taught) and pedagogy (how the educator imparts that subject) as the cornerstone for effective ed tech integration. To enhance student learning, technology must both convey and complement teaching. According to the TPACK framework, these tools (hardware, software, applications, and information literacy techniques) are best used to assist students in gaining a more potent, more profound understanding of the subject matter.

❖ **Challenges of using Techno-pedagogical skills**

Using techno-pedagogical skills presents various challenges, and one must overcome these challenges to implement them among learners successfully.

1. **Inadequate ICT infrastructure for utilising techno-pedagogical talents**

   Numerous colleges lack adequate rooms or structures to accommodate the technology. A pitiful ICT lab that has never used web-based instruction, electronic devices such as telephones, cellular phones, fax machines, radio, television, video, computers, a poor cable network with the internet, e-mail, hardware and software, and ineffective satellite systems all contribute to learners' inability to use techno-pedagogical skills.

2. **Inadequate proficiency in the English language and web material**

   English is the most frequently used language on the internet. English language proficiency is low in our country, particularly outside urban regions. This is a significant impediment to entirely using the educational benefits of the World Wide Web.

3. **Techno-pedagogical Teachers' Tragedy**

   ICT competence in teacher education is complex because mediated communication demands more outstanding excellence from teacher educators. Imposing technological systems from the top down without including faculty and students is the most common mistake in introducing techno-pedagogical skills into teaching (UNESCO, 2009).

4. **Teachers are underpaid**

   Despite the knowledge barrier, teaching personnel have little incentive to invest time in converting from blackboard to techno-pedagogical methods via ICT or online learning.

5. **Adverse Effect on Research and Development**

   Techno-pedagogical competence necessitates a robust research foundation for intensive formative research. Only two-way communications, such as audio and video, are more effective than one-way communication.

6. **Inadequate awareness of available technological-pedagogical skill services**

   Universities provide a diverse range of information technology services to develop techno-pedagogical skills. However, students, mainly teaching staff, appear to be unaware of the breadth of technology services available.

7. **Using software flaw**

   Use unlicensed software, i.e., pirated software in standard formats to save on maintenance costs and avoid legal complications associated with the use of ICT in different universities. Even if licensed hardware and software are available, a lack of capacity for equipment maintenance creates significant difficulties in implementing them.

8. **Techno-pedagogical resources are inadequate**

   Inadequate use of multimedia resources in hybrid teaching methods results in lower learning outcomes for students, resulting in ICT illiteracy among students at the higher education level.

9. **Departmental incoherence**

   Campuses, colleges, and departments lack coordination. The University, colleges, and departments have websites that do not cross-reference, resulting in a partial exchange of information for students.

10. **Frequent blackouts and fluctuations in power**

    Power outages and fluctuations have a mitigating effect on the potential impact of using techno-pedagogical skills. One outage destroyed a functioning computer and other equipment that supports the Technopedagogical framework.

❖ **How to Release Challenges associated with using Techno-Pedagogic Skills**

Innovative usage of techno-pedagogy can potentially alleviate education issues. Despite the complexity described above, there are ways to overcome the problems of using ICT in education. Having a command of the English language and understanding online content is vital. As English is an international language and most of the material is available on the internet in English, it is necessary to improve one's skills in the English language. It is

possible to reap the most significantpotential benefits from using the World Wide Web in this manner. Further, the following points are crucial as well:

1. **Development of technological and pedagogical abilities**

   Techno-pedagogical abilities are required for mediated education. Teacher educators must transition from pedagogues to techno pedagogues in their teacher education programs. It is necessary to appropriately integrate micro-teaching skills, media skills, and techno-pedagogic abilities into the curriculum. As a result, programs to increase ICT literacy and techno-pedagogic competencies among teacher educators and classroom teachers should be implemented. Identification of Techno-Pedagogic Abilities and training of pupil teachers in these skills are urgently required at all teacher education levels, with a particular emphasis on primary and secondary education.

2. **Resolve the deficit of educators with technological pedagogical abilities**.

   The development of the internal capacity of a teacher to use techno-pedagogical skills in teaching, learning, and research requires teachers to be involved in the mounting of training, workshops, and the designing of specific techno-pedagogical skills through ICT to ensure their relevance and effectiveness in teaching, learning, and research. Training should be provided in areas where competence is scarce in performing such evaluations to ensure that the effects of technology adoption and use are well recognised and accounted for in both short and long-term planning.

3. **Infrastructural upgrade for TPACK**

   Human and material infrastructure, as well as media culture, must be developed. Colleges must have technology-friendly rooms or buildings. Phones, cellular phones, faxes, radio, television, video, computers, cable networks, internet, e-mail, and hardware and software should be available in the pitiful techno-pedagogy-supported lab. Moreover, there must be 24/7 access to the internet, telephone services, and cable networks.

4. **Teachers' incentives**

   All stakeholders in the development of techno-pedagogical abilities must be trained. They should not fear that technology will replace instructors. Teachers' educators should encourage teachers to change their teaching methods from the chalkboard to hybrid, i.e. techno-pedagogical. Providing pre-training for faculty is critical when implementing techno-pedagogical abilities.

5. Resolution on R&D

A solid research foundation is necessary for research and development. Two-way audio and visual communications must be established for this. Colleges and universities should provide digital resources such as digital libraries so that students, teachers, and professionals can access research and course materials anytime and anywhere.

6. Awareness of existing pedagogical services

There are several opportunities to use tech pedagogy in universities. Thus, teachers appear aware of the range of digital services available. The goal should be for all educational institutions to develop low-cost, low-power access devices.Clear standards and procedures for purchasing computer hardware and software are required to avoid such issues. Unlicensed or pirated software in standard formats should be penalised. As a result, colleges and universities must provide adequate equipment maintenance capability.

7. Everlasting techno-pedagogy resources

Sharing of resources and innovations can cut development expenses. Audio cassettes, video films, computer-assisted learning, educational radio, educational TV, and web-based instructional material should have been developed. Governments and higher education institutions must implement successful media deployment and sustainability strategies. Sound pedagogical skills contribute to improved student learning results.

8. Improve departmental coordination

Campuses, colleges, and departments should work effectively together. As a result, if the university creates separate websites for colleges and departments, they must have cross-references to share information with students. The MHRD, Department of Information Technology, and Department of Telecom will work together to ensure that electronic universities and digital campuses are entirely electronic.

9. Reducing frequent power outages

An uninterruptible power supply (UPS) can save data in an emergency. This requires electricity enhancement initiatives such as solar, hydro, wind, wave, or biogas plants to overcome frequent power interruptions and fluctuations.

10. Creating pedagogical E-content

Best practices in E-content generation, dissemination, selection, and evaluation necessitate extensive networking among E-content users and providers.

11. Techno-pedagogical teacher education

Educational Technology (ET) and ICT in Education courses should be at the core of all teacher education levels. There may be extended certificate and degree programs in these areas. ET and ICT should also be given refresher courses. Teachers should be encouraged to plan and implement digital lessons.

12. Computer-Based Learning Resources Management System

All educational institutions' libraries should have learning resources such as CDs and videos. Libraries must gradually become digital libraries where teachers can combine materials to build a techno-pedagogical frame.

13. Web page creation

Web pages should be created to teach various subjects using tech pedagogy. Various techno-pedagogical skill-based CDs may be generated as web resources.

14. Promote existing ICT services

A publicity campaign will significantly enhance the impact of comprehensive ICT-based pedagogical skills training. Events (e.g. student orientation, departmental meetings) or platforms (e.g. KNUST, for example, has a vibrant Facebook group.)

5.1.5: THE TECHNOLOGY INTEGRATION MATRIX (TIM)

The Technology Integration Matrix (TIM) provides a framework for describing and targeting the use of technology to enhance learning. The TIM incorporates five interdependent characteristics of meaningful learning environments: active, collaborative, constructive, authentic, and goal-directed. These characteristics are associated with five levels of technology integration: entry, adoption, adaptation, infusion, and transformation. The five characteristics of meaningful learning environments and five levels of technology integration create a matrix of 25 cells, as illustrated below. All TIM descriptors apply equally well to online and face-to-face instruction; developed by the Florida Center for Instructional Technology (FCIT) in 2005, the TIM is now in its third edition (2019).

ENTRY

The teacher begins to use technology tools to deliver curriculum content to students.

ADOPTION

The teacher directs students in the conventional and procedural use of technology tools.

ADAPTATION

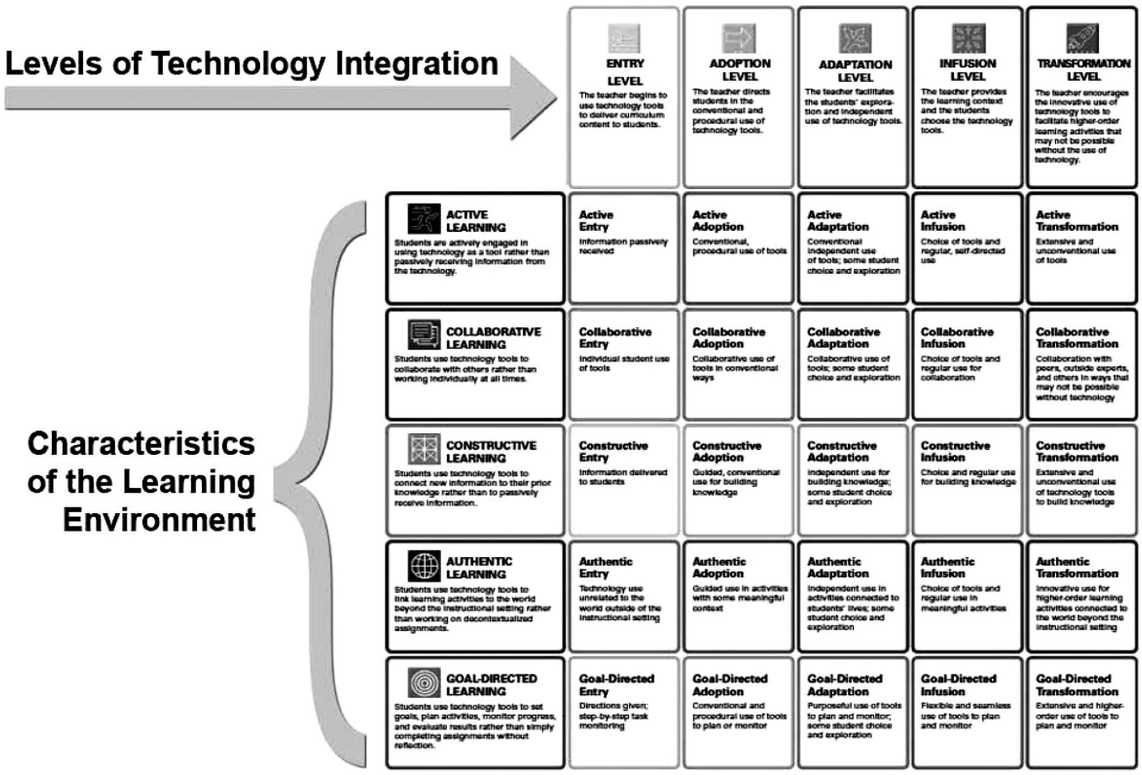
The teacher facilitates the students' exploration and independent use of technology tools.

INFUSION

The teacher provides the learning context, and the students choose the technology tools.

TRANSFORMATION

The teacher encourages the innovative use of technology tools to facilitate higher-order learning activities that may not be possible without technology.



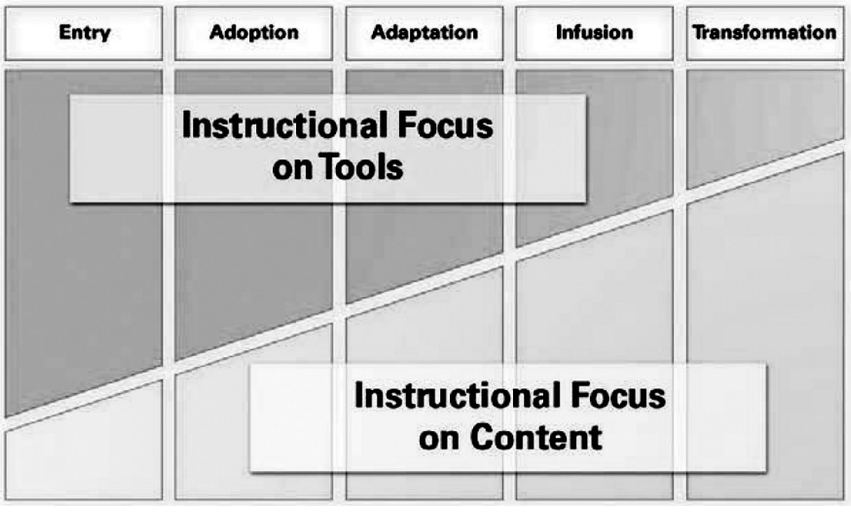
As you move along any row from left to right, the levels of technology integration increase from Entry up to Transformation. As we continually remind users, the TIM is not primarily about technology—it's about effective pedagogy. As you move from left to right along the Matrix, you'll see more active and collaborative learning practices, and so forth.

But there are also some "invisible" dimensions to the TIM. The invisible dimensions underlie the movement from left to right along the Matrix. In subsequent posts, I may unpack a few of these underlying principles individually, but here, I'd like to give an overview of some unseen principles behind the Matrix.

Instructional Focus on Tools vs Instructional Focus on Content

At the lower levels of the Matrix, the teacher often has to spend instructional time learning the technology itself. We all know from experience that real learning comes from actual use, "play," and experimenting with an application. Nevertheless, some basic instruction about the tool and how to use it usually needs to precede students' use. Once the students gain experience with the specific tool, instructional time can focus entirely on the subject area content.

I remember a high school science class I observed a few years ago. The students had been using their tablet computers for years and had mastered various applications. During the class, I noticed the students' innovative use of technology. Meanwhile, the teacher was entirely focused on her subject matter. At no time during the class period was it necessary for her to stop, even for a moment, to deal with a technical issue. After the class, I mentioned some of the innovative uses I had seen among the students. She seemed mildly surprised and replied that she didn't even know they had the particular app. The students had been using their iPads for several years, so there was no need for the teacher to focus on the technology.

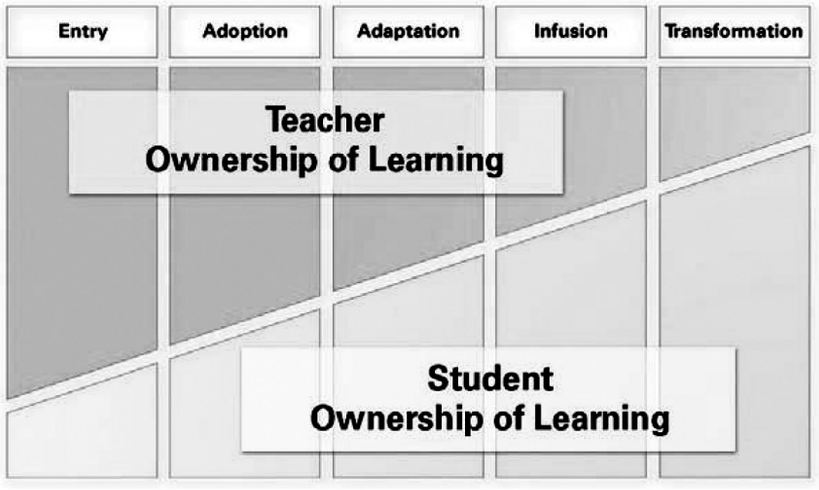


We often represent such shifts with a diagram such as this one. As we move from lower to higher levels of technology integration, we spend less time on technology tools and proportionally more time on instructional content. This graph and those that follow are intended to show a relative shift, not any specific percentages.

Teacher Ownership of Learning vs Student Ownership of Learning

Another underlying dimension of the TIM is that as we move from left to right, we also move from teacher to student-centred learning. At the lower levels of the TIM, sometimes the teacher is the only one using the technology. The teacher may use a laptop and projector

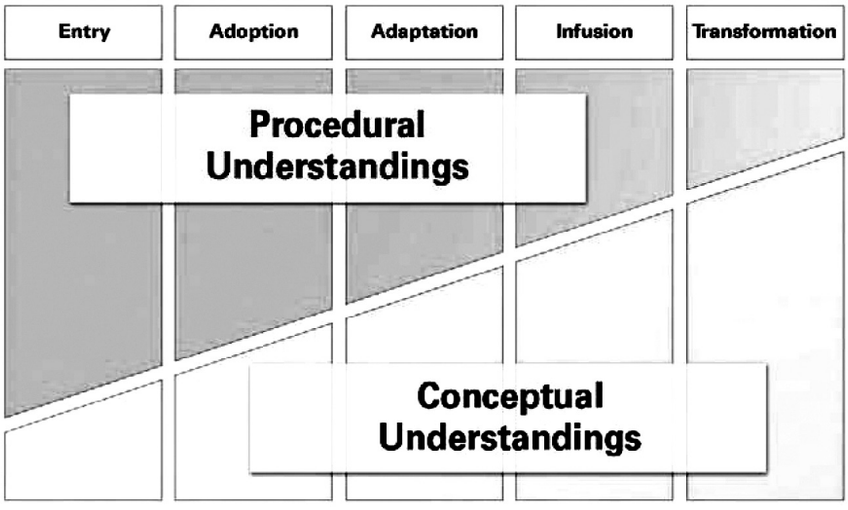
to replicate the conventional presentation they previously did with an overhead projector or a chalkboard. Nothing has improved pedagogically due to the use of technology. At the Adoption and Adaptation levels, the students get their hands on the technology, but the teacher is predominately calling the shots.



It's not until we get to the upper levels of the Matrix that students begin to take ownership of their learning. They are now the ones empowered to make decisions about which technologies to use and how to use them to accomplish their goals.

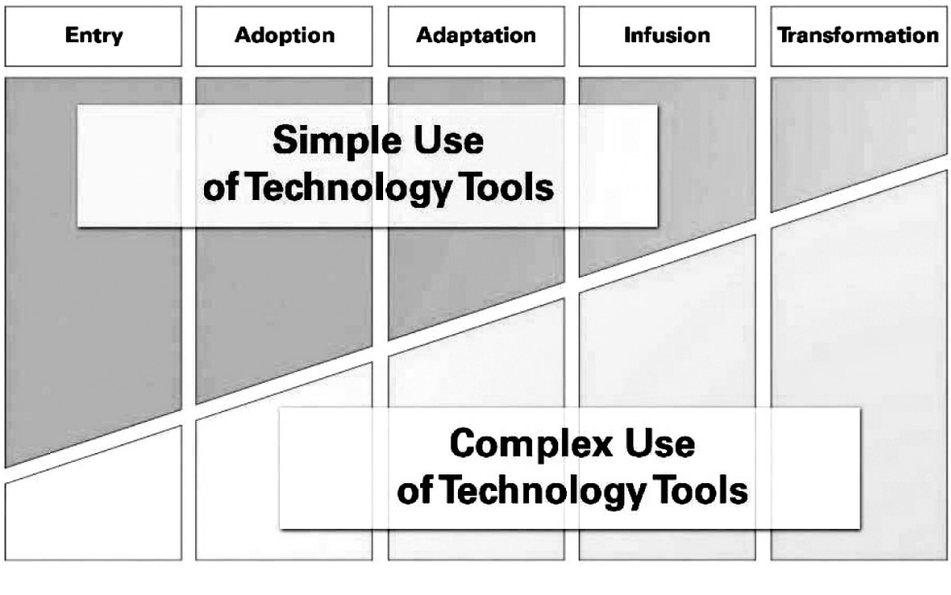
Procedural Understandings vs Conceptual Understandings

At the lower levels of the Matrix, most technology instruction is about procedures—click this to do that, use this menu to find that control, or tap this to display that, etc. Often, every class member uses the same technology and follows the exact step-by-step instructions. They are learning lots of little procedures for doing things.



Students retain that procedural knowledge at the higher levels of the Matrix, but now they are gaining a greater conceptual understanding of the technology. Previously, they used a particular app because they were told to do so. Now, they have the experience to decide which app or combination of apps will best accomplish their goals. They understand the possibilities of each technology tool.

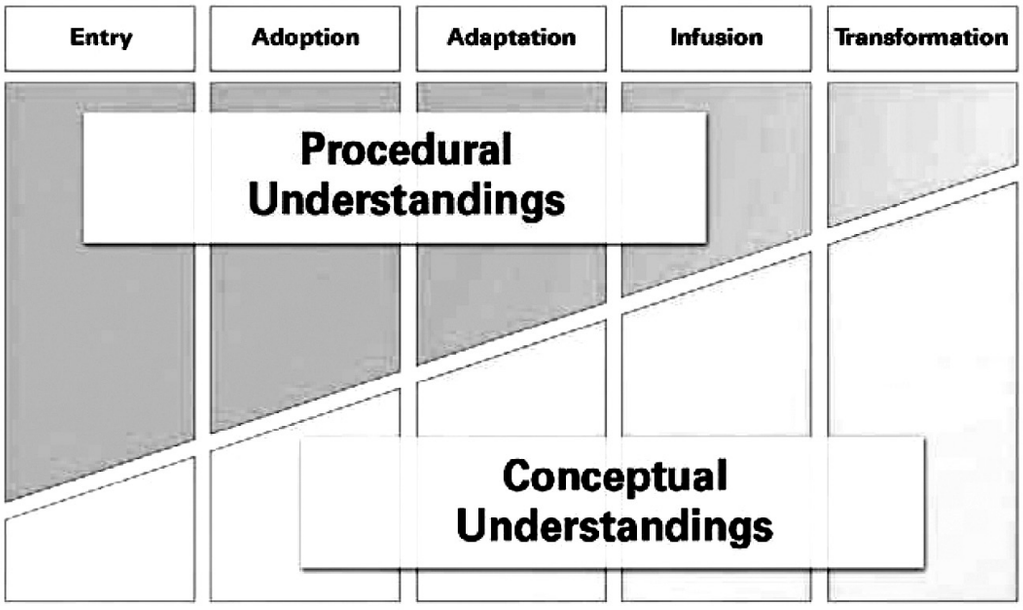
Simple vs Complex Use of Technology Tools



This is probably the most apparent shift as teaching and learning moves to higher levels of technology integration. Lower levels generally start with simple uses of technology tools. A level activity using Photoshop may involve cropping and auto-colour adjustment. Students working at a higher level may begin to use more complex features such as blending modes or batch processing. At higher levels, students not only have the ability to use more complicated tools, but they also can combine them in complex ways as needed to solve a problem.

Conventional vs Innovative Use of Tech Tools

Just as students typically start with simple uses of technology tools, they also generally start with conventional uses. Their first use of a word processor is probably to write a short paper. Their first use of a spreadsheet app is to make a simple table or add columns of numbers. And so forth. When given opportunities to explore and experiment with tech tools, students see new possibilities beyond the common uses. This is where creativity starts to kick in.



We see creativity expressed in innovative uses of technology. Creativity is a fresh way of looking at something. We can't see creative thoughts, but we can see creativity expressed in innovation. As a bonus, innovation is often a collaborative effort, whereas creativity is usually considered an individual activity.

Keep in mind, however, that innovation is not the same as invention. An invention is a new, unique creation—the sort of thing a patent office deals with. On the other hand, innovation is not necessarily the first time an idea has been implemented. Instead, the innovation is a creative breakthrough for the individual student or team. It's a new idea for them, not necessarily a new idea in the entire history of humankind. No one expects K-12 classwork to be awarded a patent.

We do not expect all—or even most—uses of technology tools to be "innovative." There are plenty of times when students use technology tools in conventional ways. Still, we also value the ability of students to overcome their functional fixedness when an innovative or unconventional use is a more elegant solution to a problem.

We could examine other underlying dimensions, such as the transition from lower-level to higher-order thinking skills or the transition from receptive learning to problem-solving. Still, I think you understand that the TIM is about more than just the five characteristics of effective learning environments listed on the left side of the Matrix.

5.1.6: CHARACTERISTICS OF DIGITAL LEARNER

Characteristics of a Digital Learner

Digital learners, often called "digital natives," exhibit various characteristics that distinguish them from traditional learners. These traits are shaped by their interaction with technology and the digital world. Here's a detailed note on the key characteristics of digital learners:

1. **Tech-Savvy**: Digital learners are proficient with technology and often use it as their primary means of learning and communication.
2. **Multitaskers**: They can handle multiple information streams and quickly switch between tasks without losing focus.
3. **Visual Learners**: Digital learners prefer visual over textual information and respond well to images, videos, and infographics.
4. **Adaptable**: The digital world constantly evolves, and digital learners quickly adapt to new tools and technologies.
5. **Creative**: They use digital tools to create new content, not just consume it, demonstrating innovation and creativity.
6. **Global Citizens**: Digital learners are aware of their international audience and understand the power of connecting with people around the world.

These characteristics are not exhaustive but provide a snapshot of the skills and behaviours that are increasingly important in the digital age. Educators and institutions must adapt their teaching strategies to cater to these traits, ensuring that learning environments are conducive to the needs of digital learners.

5.1.7: LET US SUM UP

Techno-pedagogy refers to integrating technology into pedagogical practices to enhance teaching and learning experiences. It involves the thoughtful and intentional use of technology tools and resources to support and facilitate educational goals and objectives. Techno-pedagogy recognises that technology has the potential to transform traditional teaching and learning methods by providing new opportunities for engagement, collaboration, and personalised learning.

TPACK is the most common technology integration model among educators. TPACK provides educators with a framework for understanding technology's role in education.

TPACK is based on the following three areas of core knowledge:

1. Content Knowledge
2. Pedagogical Knowledge
3. Technological Knowledge

When content knowledge and pedagogical knowledge are combined, a hybrid domain arises. Pedagogical content knowledge includes topic and pedagogy expertise and specialised knowledge required to teach the material.

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5.1.8: ASSIGNMENT

1. Write a note on Techno-pedagogy.
2. Elucidate the concept and steps of the Techno-pedagogical content knowledge (TPACK) model.

3. Discuss the Technology Integration Matrix (TIM) model.

4. Elaborate on the Characteristics of Digital Learners.

5.1.9: SUGGESTED READINGS

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BLOCK- 5
Pedagogy and Technology

Unit-2
ICT Integration in teaching and learning

CONTENT STRUCTURE

5.2.1: INTRODUCTION

Internet and communications technology have "flattened" the educationalworld and provided enormous possibilities for learnerchoice, flexibility, and interaction. However, this flattening of the educational environment should not translate into a diminution ofeducational responsibility. Appreciating teaching presence is anenormous design challenge, but it is also crucial to avoid thepotential anarchy of the Internet and the "cult of the amateur"(Keen, 2007). Allowing the Internet's unpredictable influence toundermine teaching presence would be a grave mistake if the goalsare discourse, critical reflection, and deep understanding.Our central contemporary educational challenge is how wedesign purposeful educational experiences using the potential of theInternet to bring teachers and learners together in sustained ways,while not losing the focus and direction central to any educationalexperience. More specifically,

how do we design an educationalexperience that combines the potential for asynchronous onlineand synchronous face-to-face discourse in a reflective mannerthat provides the time to think deeply and not speed over enormousamounts of content? How do educators balance the flexibilityand freedom of online learning with expert guidance in apurposeful face-to-face learning environment? In this chapter, we address blended course design and challenges. The central challenge ofblended designs rests on the thoughtful combination of the Internetand the culture of critical inquiry in higher education.

Adding on to excessive workloads or simply reducing class timewill not meet the need for more meaningful learning experiencesin this age of access to copious amounts of information via the

Internet. We will not see any improvements in learning satisfactionor in outcomes throughfaculty development workshops thatwork on the margins by promoting the latest techniques. Suppose we hope to make significant gains in the quality of the educational experience, which must be the goal as the educational needs of society are changing so radically. In that case, we must focus on fundamental redesignstrategies. Design is central to releasing the potential of blendedlearning and is the focus of this unit.

5.2.2: OBJECTIVES

By the end of this Unit, learners will have gained the following essential understandings -

- ❖ Apprehend the idea of Technology in Education.
- ❖ Understand how teachers can effectively integrate technology in the classroom.
- ❖ Conceptualise the scope and limitations of technology integration in education.
- ❖ Define Technology Dependence and Learner Autonomy.
- ❖ Conceptualise the ASSURE Model and explore its applications.

5.2.3: TECHNOLOGY IN EDUCATION

Educational Technology (often abbreviated as edtech or edutech) combines computer hardware, software, and academic theory and practice to facilitate learning. It encompasses various tools and approaches designed to enhance teaching, engage students, and improve learning outcomes.

1. <u>Channels of Impact</u>:

Technology affects education through **five distinct channels**:

- **Input**: Technology provides resources, content, and materials for learning.
- **Means of Delivery**: Digital platforms, online courses, and virtual classrooms enable flexible and remote learning.
- **Skill Enhancement**: Edtech equips students with digital literacy and 21st-century skills.
- **Planning Tool**: It assists educators in curriculum design, assessment, and personalised learning.
- **Social and Cultural Context**: Technology influences how students collaborate, communicate, and engage with knowledge.

2. **Challenges and Opportunities**:

- **Access and Equity**: While technology can bridge gaps, ensuring equal access remains challenging.
- **Quality Enhancement**: Edtech can elevate the quality of education by providing interactive and adaptive learning experiences.
- **Advancements**: Innovations like AI, immersive environments, and gamification transform teaching and learning.
- **System Management**: Effective integration of technology requires robust governance and teacher preparation.

3. **Balancing Act**:

- Views on technology's role in education are diverse and sometimes contentious.As technology evolves rapidly, debates continue about its impact on learning and society.

In summary, technology in education is a powerful tool that can revolutionise learning experiences. However, thoughtful implementation, addressing challenges, and maintaining a balance are essential for its success.

How can teachers effectively integrate technology in the classroom?

Integrating technology into the classroom can significantly enhance learning experiences. Here are some practical strategies for effective technology integration:

1. **Set Clear Learning Objectives**:

- Begin by defining specific learning goals. Understand what you want students to achieve through technology use.
- Align technology integration with curriculum objectives to ensure relevance and purpose.

2. **Choose Supporting Tech Tools**:

- Select tools that align with your learning objectives. Consider factors like ease of use, student engagement, and compatibility with existing resources.
- Examples of tools include interactive whiteboards, educational apps, online platforms, and multimedia resources.
- **Blend Technology into Existing Curriculum and Workflows**:Integrate technology seamlessly into your teaching routines. Avoid treating it as an isolated activity.
- Use tech tools to enhance existing lessons, activities, and assessments. For instance, create digital quizzes or collaborative projects.

3. **Balance Screen Time with Traditional Teaching Methods**:

- While technology is valuable, maintain a balance. Combine digital activities with face-to-face interactions.
- Leverage technology for research, simulations, and multimedia presentations, but also encourage discussions, group work, and hands-on experiences.

4. **Teach Digital Citizenship and Internet Safety**:

- Equip students with essential digital skills. Teach them responsible online behaviour, privacy protection, and critical thinking.
- Discuss the ethical use of technology, citing real-world examples and potential consequences.

Remember, effective technology integration is not just about using tools but about empowering students, fostering engagement, and promoting a deeper understanding of content. When done thoughtfully, technology becomes an integral part of student-centred learning.

5.2.3.1: PEDAGOGY AND INNOVATIVE PEDAGOGY

❖ **What is Pedagogy?**

The theory and practice of learning and how this process influences and is influenced by learners' social, political, and psychological growth is called pedagogy. Pedagogy is the "*art, science, or profession of teaching, especially education*". (Merriam-Webster).Although this definition encompasses many areas of education, pedagogy is essentially the study of

teaching methods. Thus, pedagogy has several moving pieces, including instructional styles, feedback, and assessment.

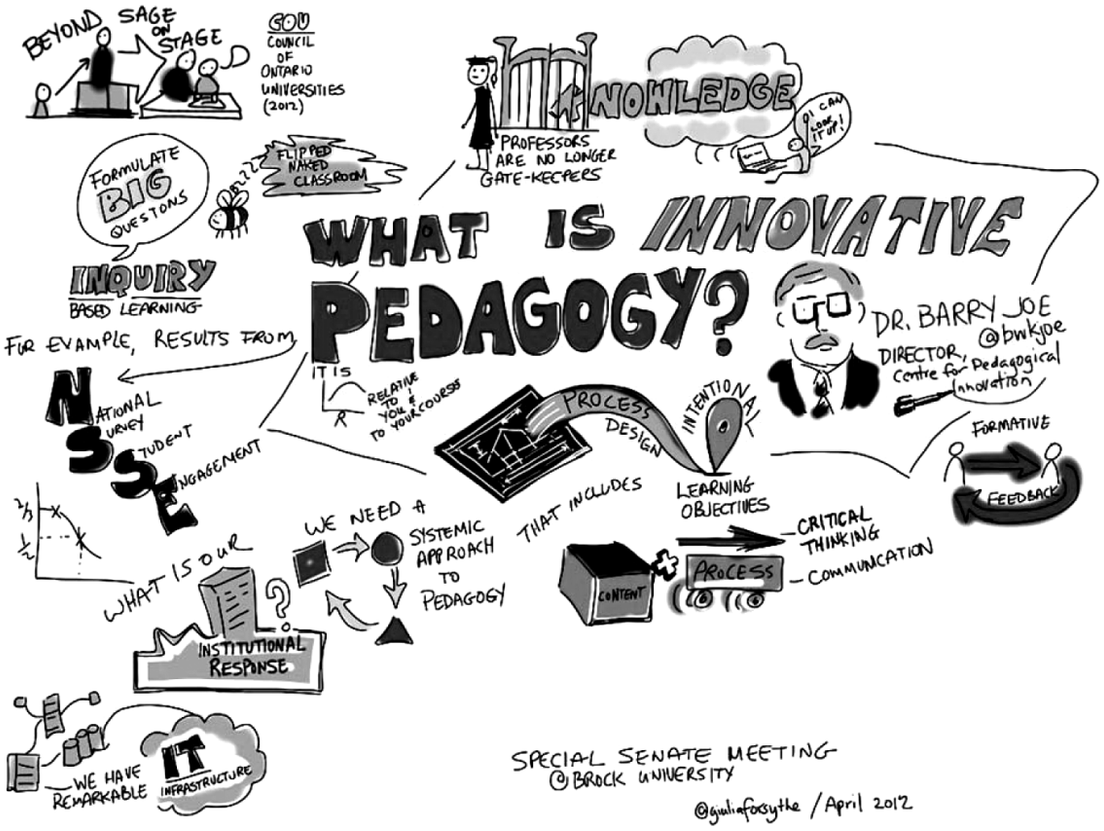
❖ Pedagogical skills

Pedagogical abilities include organising, creating, leading, and developing education and teaching abroad and subject-specific understanding of student learning. Additionally, pedagogical abilities include the competence to relate classroom instruction to relevant research.Pedagogical skills have vital elements, which include:

(1) knowledge of representations of subject matter (content knowledge); (2) understanding of students' conceptions of the subject and the learning and teaching consequences; and (3) general pedagogical knowledge (or teaching strategies). Other aspects were (4) curriculum knowledge, (5) educational context understanding, and (6) educational goals.

❖ Innovative Pedagogy

Innovation in pedagogy is due to the changing scenario from knowledge-based and rote learning to more skill-based learning. Teachers apply their subject-matter expertise, teaching and learning techniques, and technological expertise to create experiences that promote student learning, creativity, and innovation in both face-to-face and virtual settings.



Teachers can use pedagogy to impact student learning and capture students' attention. Pedagogical approaches to teaching theoretical concepts aid students in improving their recalling capacity by allowing them to recall all of the visions given to them even after a long period. This is an example of innovative learning when students can retain all the ideas discussed in their classes for a long time.

❖ **Need for Innovative Pedagogical Skills**

Innovative Pedagogy requires engaging classroom experiences and mutual respect between educators and learners. The objective is to assist students in building on existing knowledge and skills, developing and designing, and providing educators with curricula that are meaningful to students and aligned with their needs and cultures.

Innovative pedagogical skills help students make teaching more attractive by developing new education methods, allowing teachers and facilitators to achieve their goals. In addition, various innovative pedagogical strategies provide a solid base for improving learners' skills.

"The first step in teaching students is to provide opportunities for teachers to be innovators themselves."

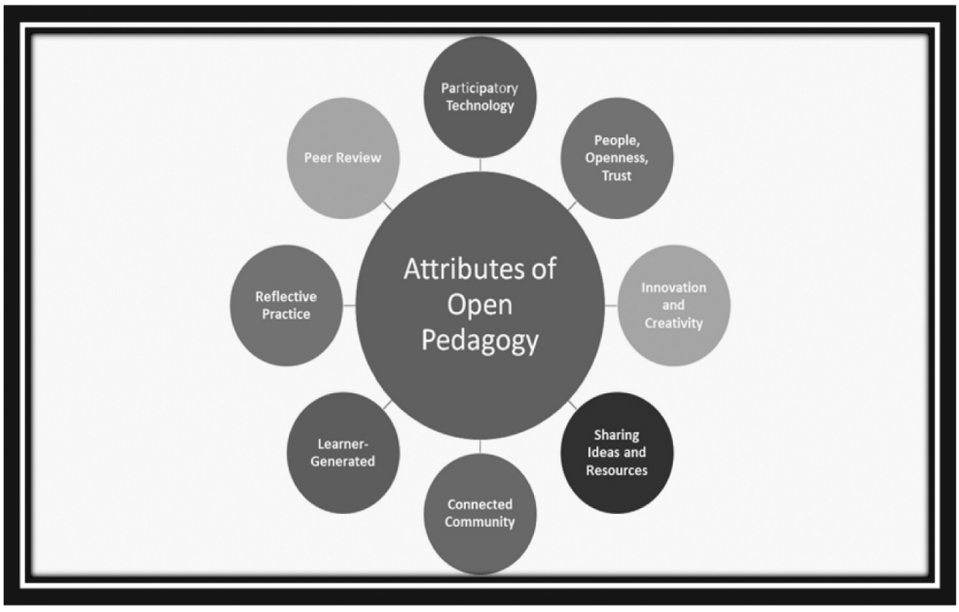
Teachers are dedicated to developing new ideas to implement in their classes.Learning innovations means (technologies, methods, and techniques): (i) an absolute innovation (completely new technology), (ii) a modernised innovation (significantly improved technology), (iii) a modified innovation (slightly improved technology), and (iv) an innovation, technology introduced to a new territory (Mynbayeva and Sadvakasova (2007)).

Some obvious questions that float in our mind about innovative pedagogy are:

- **How should we teach?**
- **How can you make the classroom full of motivation and encouragement?**
- **How do you teach?**

Innovative pedagogical skills can be developed by applying various innovative pedagogical strategies. These strategies help the learners achieve their specific goals.

Innovative Pedagogical strategies are needed because teachers and students are encouraged to study, research, and use all available tools to discover something new in the classroom. This entails a new way of looking at problems and approaching their resolution. The thought process that goes into it will enhance students' problem-solving abilities and creativity.



Attributes of Open Pedagogy

Source:https://wordpress.viu.ca/enhancingpersonalizedlearning/2017/09/12/design-attributes-of-open-pedagogy-by-bronwyn-hegarty/ (Links to an external site.)

❖ **Innovative Pedagogical Strategies**

There are various innovative pedagogical strategies that a teacher needs to use in their classrooms and out of classrooms (Both Online and Offline, Synchronous and Asynchronous):

- Team Teaching
- Discussion Method
- Cross-over Learning
- Based on learning theories
- Incidental Learning
- Conceptual Learning
- Role-playing
- Creative Teaching
- Focused Learning
- Concept Mapping,

- Expert Group Methods
- Context-based learning
- Assessment-based learning
- Immediate feedback learning
- Based on the learner's nature
- Learner-Centered
- Independent Projects
- Peer Tutoring
- Based on analytics **of** Emotions

❖ **Urgency of Innovative Pedagogy**

Due to the reliance on rote memory rather than thoughtful and analytic learning, creative pedagogical practices are urgently needed among learners. Students concentrate on getting good grades rather than understanding the subjects. Team spirit and collaboration are also weak since competition takes precedence over cooperation. The focus should be switched to the learner's particular demands based on their interests and ingenuity. Rather than relying on teachers, more emphasis should be placed on self-paced learning.

As a result, one needs to shift their focus on innovative pedagogical strategies by implementing innovative skills among learners, such as creativity, critical thinking, reasoning, communication, problem-solving, collaborative skills, and other abilities, which are all critical in the current scenario.

5.2.4: SCOPE AND LIMITATIONS OF TECHNOLOGY INTEGRATION

A comprehensive overview of the scope and limitations of technology integration are as follows:

❖ **Scope of Technology Integration**

1. Development of 21st Century Skills and Competencies:

- Technology integration is crucial in fostering 21st-century skills and competencies in teaching and learning.

- Innovative pedagogical strategies, including the use of technology, contribute to the coherent development of skills such as communication, critical thinking, collaboration, problem-solving, and computational thinking.
- Teachers can leverage technology tools to enhance these skills among students.

2. Enhancement of Teaching and Learning Environment:

- Technology integration creates an exciting teaching and learning environment.
- Learners are motivated, and academic achievement is positively impacted.
- Tools like laptops, whiteboards, smartboards, mobile devices, and online learning platforms facilitate this enhancement.

3. Fourth Industrial Revolution Opportunities:

- The Fourth Industrial Revolution presents opportunities for educational innovation.
- Teachers must embrace digital transformation to achieve academic outcomes as educational change agents.
- Integrating new technologies into teaching practices is essential for sustainable progress.

❖ **Limitations of Technology Integration**

1. Constraints and Challenges:

   Timeframe: Integration projects often have specific deadlines or timeframes within which they must be completed.

   Budget: Limited budgets can impact the scope and scale of integration efforts.

   Resource Availability: Access to resources, training, and support can be challenging for teachers.

2. Teacher-Related Barriers:

   Attitudes and Beliefs: Some teachers may resist technology integration due to their attitudes and beliefs.

   Resistance: Overcoming resistance toward technology in the classroom is essential.

   To integrate technology effectively.

3. Pedagogical Considerations:

   Balancing Technology and Pedagogy: Effective integration requires finding the right balance between technology and pedagogical practices.

Quality of Integration: It is critical to ensure that technology enhances learning rather than detracts from it.

Equity and Access: Addressing disparities in technology access among students is a challenge.

Therefore, technology integration offers immense potential for improving education, but it also comes with challenges. Educators must navigate these limitations while leveraging technology to create meaningful student learning experiences.

5.2.5: TECHNOLOGY DEPENDENCE AND LEARNER AUTONOMY

✓ **Technology Dependence**:

Definition: Technology dependence refers to the reliance on technological tools, devices, or platforms for various aspects of learning and daily life.

❖ **Characteristics**:

- Learners who are technology-dependent heavily rely on digital tools, software, and online resources for their educational needs.
- They may struggle to function effectively without access to technology.
- Technology dependence can lead to challenges when technology is unavailable or fails.

Example: A student who cannot study without their laptop, internet connection, or specific software tools demonstrates technology dependence.

✓ **Learner Autonomy**:

Learner autonomy refers to a situation where learners actively engage in their learning process, take responsibility for their learning, and make informed decisions about how they learn.

❖ **Characteristics**:

- Autonomous learners are self-directed and motivated to explore, reflect, and adapt their learning strategies.
- They seek out resources, set goals, and monitor their progress independently.
- Autonomy encourages critical thinking, creativity, and lifelong learning.

Example: A student who proactively selects relevant reading materials, sets personal learning goals, and reflects on their progress demonstrates learner autonomy.

❖ **Comparison**:

- **Technology dependence** relies on external tools, while **learner autonomy** emphasises self-directed learning.
- Technology dependence can hinder autonomy if learners become overly reliant on specific tools.
- Learner autonomy promotes independence, adaptability, and ownership of the learning process.
- Both concepts intersect using technology to enhance learning, but autonomy goes beyond mere tool usage.
- Thus, to be precise, while technology can enhance learning experiences, fostering learner autonomy is crucial for developing lifelong learners who thrive in diverse contexts.

Model Lesson Plansby using Techno-Pedagogical Approaches

❖ How can we prepare a lesson plan by using Techno-Pedagogical Approaches? We can prepare a **Lesson Plan using the Assure Model.**

First, let us take a look at the Assure Model.

To become proficient, knowing when to employ various educational tactics and passive interactive devices in today's classroom is critical. The practical and systematic use of media technologies is required.

The ASSURE model is a step-by-step approach to organising and delivering instructions incorporating technology and media into the learning process. It also refers to a method for developing lesson plans that assist teachers in arranging classroom procedures.

The ASSURE model is an adaptation of the ISD (Instructional Systems Design) process for use by educators in the regular classroom.

Teachers and trainers can use the ISD process to create and develop the most appropriate learning environment for their learners. Heinrich and Molenda created the ASSURE model in 1999. It is a well-known instructional design guide incorporating multimedia and technology to enhance the learning environment (Patrick Lefebvre, 2006).

The ASSURE model is a procedural guide for creating and delivering instructions incorporating technology and media. Additionally, it refers to a systematic approach to lesson planning that assists teachers in organising instructional procedures.

A stands for Analysing learners

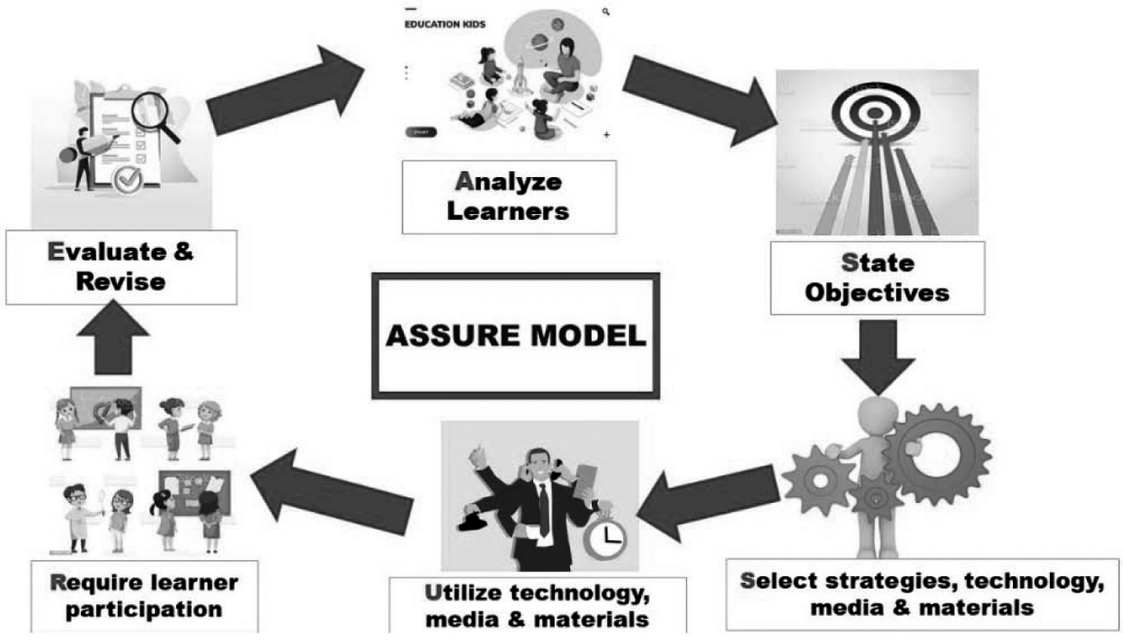
S stands for State standards and objectives

S stands for Select strategies, technology, media, and materials

U stands for Utilize technology, media, and materials

R stands for Require learner participation

E stands for Evaluate and revise



Steps of the ASSURE Model

I. Analyse Learners

This includes information such as the number of students, grade or age level, gender, socioeconomic factors, exceptionalities, and cultural/ethnic/or other types of diversity.

II. State Objectives

Describes what the learner will do as a result of the lesson.

III. Select Methods, Media, & Materials

In this step, the instructor will link the audience and the objectives. It would be best if you decided what method you will primarily use.

IV. Utilize Methods, Media, & Materials

Make a plan for how you willutilise your media and materials. Select and discuss in detail how you will include each sort of media or content into your lesson to assist your students in achieving the class's goal.

V. Require Learner Participation

Describe how you will get each learner "actively and individually involved in the lesson.

VI. Evaluate student performance

The evaluation should be in line with the goal. Some objectives can be assessed using a pen-and-paper test.

❖ **Samples of the lesson plan using the ASSURE model are shown below:**

✓ **1st ASSURE Model Lesson Plan**

Title: Parts and Functions of a Tooth

Subject: Science

Class Level: Eight Standard

This lesson plan has been drawn based on the Assure model. All the steps have been used.

1. Analyzing Learners

General Characteristics

Participants in this class are standard eight pupils. The class is limited to twenty pupils (n=20) to ensure personal attention, adequate understanding, and follow-up.

Entry Characteristics

There are many different types of energy, including radiant, thermal, electrical, and chemical energy. Energy can be kinetic (moving) or potential (storing). The Sun, or solar energy, is Earth's principal energy source (radiant or light energy, not heat or thermal).

Learning Styles

This lesson will use methods that appeal to verbal and individual work and small and large group discussions.

II Objectives

By the end of the lesson, the learner should be able to:

a) Draw a flow chart of energy and its types.

b) State the functions of different types of energy.

c) Compare the Kinetic and potential energy.

III Methods, Media, and Materials

Methods

The teacher will begin the lesson with a brief introduction and overview explaining the parts and functions of different types of energy using a diagram. Experiment with your hands. Conduct engaging, hands-on scientific experiments with your pupils to get them tactile. Use your imagination to compare different types of energy. Curl up on the couch with a good book. Demonstrate how to save energy.

Media and Materials

Books, chalk, and the blackboards in this lesson will be used for interpretation. The charts and the models will also be used for demonstrations.

IV. Utilizing Media and Materials

Preview the Materials

The teacher should have fully covered and researched the topic before introducing it to the pupils. They should be aware of all types of energy and their functions and be able to answer any question posed by the pupil related to the topic.

Prepare the Materials

The teacher should ensure that the charts and the models are ready before the beginning of the lesson. Enough books, among other teaching and learning resources, should be available and prepared to distribute to the pupils.

Prepare the Environment

The teacher should ensure that the classroom is comfortable and appropriate for teaching and learning. This includes sufficient lighting, proper ventilation, suitable seating arrangements, and classroom sweeping.

Prepare the Learner

The lesson will begin with an introduction by an introductory video related to different forms of energy. There will be an icebreaker and an overview of the parts and functions of the teeth. The teacher will distribute the books, allowing pupils to follow the teaching.

V Require Learner Participation

Initial Activities

After introductions, icebreakers, and an overview of the elements and types of energy, the teacher will guide the pupils through systematic steps to understanding. The class will then participate in manageable discussion groups (7-12 members) to allow the learners to discuss the topic and ask questions.

VI Evaluate and Revise

The lesson will close with a summary from the teacher. The question-and-answer method will be used for evaluation and revision. The questions will include:

a) What are the distinctions between electrical and chemical energy?

b) Draw and explain two examples of energy using a diagram.

2nd Example of LESSON PLANNING OF ASSURE MODEL

Duration of the lesson: 60 minutes/ Subject Matter: Subject Verb Agreement

Class: 9th Grade/ Analyze the Learners

Students Characteristics:

The lesson is designed for 9th-grade students aged 14 to 16, comprising 15 female and five male students. These students are skilled in using technology gadgets such as smartphones, tablets, and computers. They use technology primarily for educational purposes. The student's cognitive levels are average to above average. They enjoy writing, speaking, or any relevant activities that could develop their talents. Most of the students are active rather than passive learners.

Learning styles:

Most students in the class are visual learners and are more active in visual instructional materials, especially in projected materials like slide presentations and visuals.

II. State Standards and Objectives

At the end of 60 minutes period, the students will be able to:

1. Define clearly the rules of subject-verb agreement through the lesson presentation;
2. Value correctly the importance of the subject-verb agreement in essay writing and
3. Perform accurately the rules of subject-verb agreement by writing a short poem

III. Select Strategies, Technology, Media, and Materials

Strategies:

Teachers will use subject-centered and learners-centered strategies in an interactive approach to teaching.

Technology and Materials:

The teacher will present their topic through projected materials like a projector, and studentscan access laptops and projectors to present their output.

Media:

Students will use visual photos as a representation of their final output.

IV. Utilize Technology, Media, Materials

Prepare the materials:

Laptops, projected materials, and visual photos will be checked for the appropriateness of the topic and accessibility for the students.

Prepare the environment:

The projected materials will be placed in front of the students, while the chairs will be arranged to allow small group work. Ventilation and other related things will be prepared to make the classroom conducive to learning.

Prepare the learners:

Learning objectives will be presented to students at the start of the lesson. Students will receive a copy of the topic for reference as a guide to their final output and discussion.

V. Require Learning Participation

The students are expected to participate in both individual and group discussions. The lesson is structured to engage students during class discussions and activities at the end of the topic.

Individual Discussions:

Beforeusing interactive teaching strategies, during class discussions, the teacher will ask specific questions, such as the definition of the topic, its importance, etc., to develop students' critical thinking skills.

Group Activity:

Students will be divided into three groups. This will refer to the psychomotor domain, where students will apply their knowledge by writing a short poem with a picture. These activities enable the students to practice subject-verb agreement rules through writing. The students will present their output using the laptop and projector.

VI. Evaluate and Revise

The students will be assessed through formative examination aligned to three domains.

Multiple Choices(Objective Type):

This will test the cognitive levels of the students before the topic.

Essay (Subjective Type):

The students will write an essay about the importance of subject-verb agreement in constructing a sentence. Before the affective domain, students will respond to the topic's importance.

Performance :

They were aligned to outcome-based education. Holistic education happens if the students learn and apply what they learn through writing a short poem using subject-verb agreement. This type of assessment will be graded using a rubric.

At the end of the discussion, feedback should allow the learners to share their perspectives about the topic as the teacher listens to them. Feedback will also help the students clarify things and better understand the subject.

Revised:

The assessment results will determine whether you are an effective teacher or not if the students get high scores on holistic assessment methods like paper and pen tests or performance. For the revision, the topic, strategies, and instructional materials should always be aligned with the learners' objectives and needs or interests.

5.2.6: LET US SUM UP

Educational Technology (often abbreviated as edtech or edutech) combines computer hardware, software, and academic theory and practice to facilitate learning. It encompasses various tools and approaches designed to enhance teaching, engage students, and improve learning outcomes.

Pedagogical abilities include organising, creating, leading, and developing education and teaching abroad and subject-specific understanding of student learning. Additionally, pedagogical abilities include the competence to relate classroom instruction to relevant research.Pedagogical skills have vital elements, which include:

(1) knowledge of representations of subject matter (content knowledge); (2) understanding of students' conceptions of the subject and the learning and teaching consequences; and (3) general pedagogical knowledge (or teaching strategies). Other aspects were (4) curriculum knowledge, (5) educational context understanding, and (6) educational goals.

Innovation in pedagogy is due to the changing scenario from knowledge-based and rote learning to more skill-based learning. Teachers apply their subject-matter expertise, teaching and learning techniques, and technological expertise to create experiences that promote student learning, creativity, and innovation in both face-to-face and virtual settings.

The ASSURE model is a step-by-step approach to organising and delivering instructions incorporating technology and media into the learning process. It also refers to a method for developing lesson plans that assist teachers in arranging classroom procedures.

The ASSURE model is an adaptation of the ISD (Instructional Systems Design) process for use by educators in the regular classroom.

5.2.7: ASSIGNMENT

1. Write a note on Technology integration in Education.
2. Elucidate the scope and limitations of technology integration in education.
3. Define Technology Dependence and Learner Autonomy.
4. Discuss the applications of the ASSURE Model.

5.2.8: SUGGESTED READINGS

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EDE-418
ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK-6
ICT in Education

Unit-1
Inter-relationship between ICT and Education

CONTENT STRUCTURE

6.1.1: INTRODUCTION

Technology has played an essential role in teaching from timeimmemorial, but until recently, it has remained more on the periphery of education. Technology has been usedmainly to support regular classroom teaching or to operate in distance education for a minority ofstudents or in specialised departments (often in continuing education or extension). However, in the last ten tofifteen years, technology has been increasingly influencing the core teaching activities of even universities. Some of the following trends can be seen in how technology moves from the periphery to the centre.

Credit-based online learning is now becoming a significant and central activity in most academic departments in universities, colleges, and, to some extent, even K-12 education. Enrolments in fully online courses (i.e. distance education courses)now constitute between a quarter and a third of all post-secondary enrolments in the USA (Allen & Seaman, 2014). Onlinelearning enrolments have increased by 10-20 per cent per annum in North America for the last 15 years or so,compared with an increase in campus-based enrolments of around 2-3 per cent per annum.

As more instructors have become involved in online learning, they have realised that much traditionally done in class can be done equally well or better online. As a result, instructors have gradually introduced more online study elements into their classroom teaching.So, learning management systems may be used to store lecture notes in the form of slides or PDFs, links to online readings may be provided, and online forums for discussion may be established. Thus, online learning isgradually blended with face-to-face teaching without changing the basic classroom teaching model. Here,online learning is being used as a supplement to traditional teaching. Although there are no standard or commonlyagreed definitions in this area, I will use the term ‘blended learning’ for this use of technology.More recently, though, lecture capture has resulted in instructors realising that if the lecture is recorded, studentscould view this in their own time, and then the classroom time could be used for more interactive sessions. Thismodel has become known as the ‘flipped classroom’.Some institutions plan to move much of their teaching into more blended orflexible modes. For instance, the University of Ottawa plans to have at least 25 per cent of its coursesblended or hybrid within five years (University of Ottawa, 2013). The University of British Columbia plansto redesign most of its first and second-year large lecture classes into hybrid classes (Farrar, 2014).

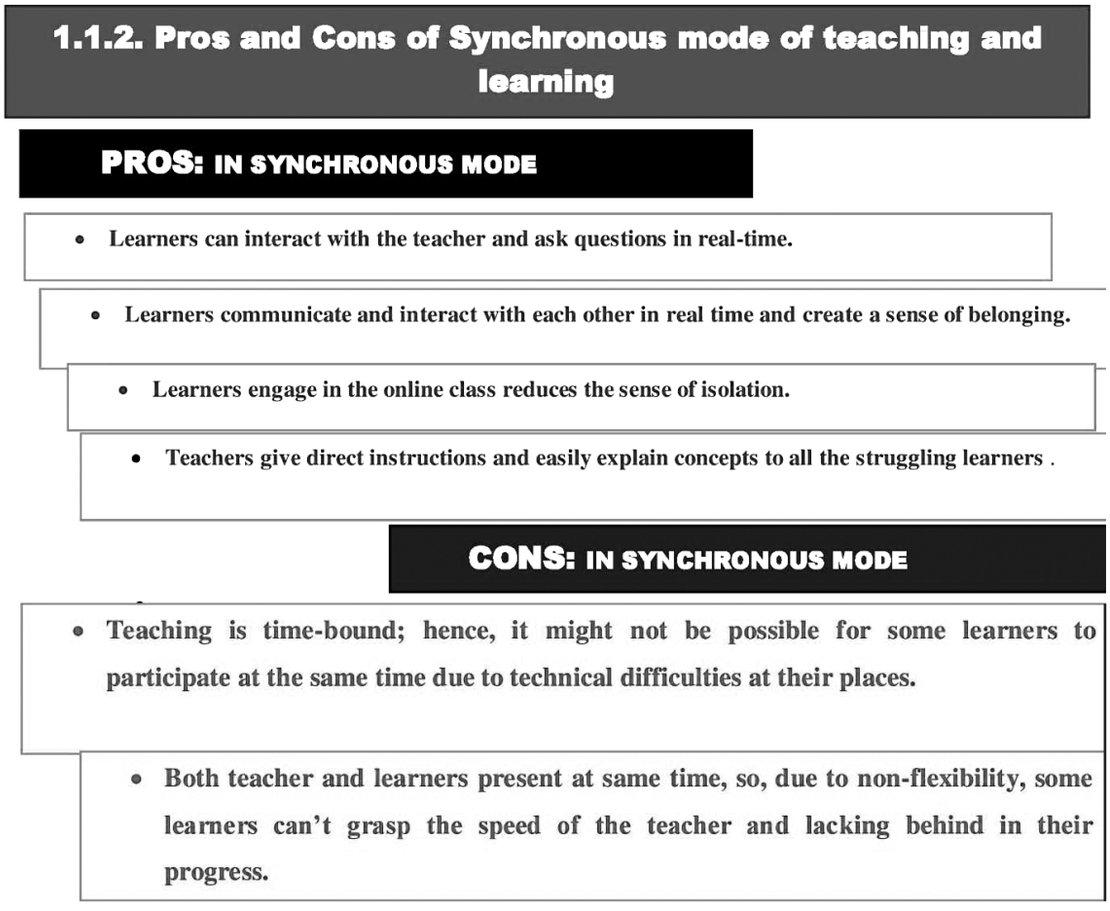
6.1.2: OBJECTIVES

By the end of this Unit, learners will have gained the following essential understandings -

- ❖ Conceptualise the broader meaning of ICT.
- ❖ Understand the inter-relationship between ICT and Education and its applications.
- ❖ Conceptualise and compare Blended Learning, Virtual Learning and Flipped Classes.

6.1.3: ICT AND EDUCATION: INTER-RELATIONSHIP AND APPLICATIONS

In online teaching and learning in synchronous mode, both teacher and learners are active participants in a virtual theatre. They interact with each other by sitting at different places and locations at one time. The teacher delivers the lesson in real-time through video conferencing, live streaming, and live chat using online platforms such as Google Meet, WebEx, Skype, Zoom, etc. They work together collaboratively simultaneously by using any of the online synchronous platforms.



Teaching and Learning in Asynchronous Mode

In the realm of asynchronous teaching, learners are empowered with the freedom to learn at their own pace and at their own time. The teacher provides online instructions to learners through E-mails, text chat, WhatsApp, Telegram, etc. Learners complete their tasks within the scheduled time given by the teacher but with the flexibility to choose when and how they learn. Learners can access the teaching material, recorded videos, virtual libraries, discussion boards, and cloud computing Documents such as Google Driveat their convenience. In this process, the teacher is always there, monitoring and advising learners, giving feedback, and evaluating them as and when needed. For seamless communication, teachers and learners can interact flexibly by using (LMS) Learning Management System, i.e. Google Classroom, Moodle, Edmodo, and many more, ensuring a smooth and personalised learning experience.

1.2.1. Pros and Cons of Asynchronous mode of online teaching and learning

PROS: IN ASYNCHRONOUS MODE

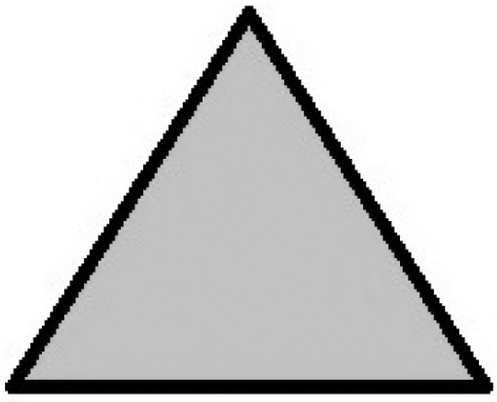
- **Learners continue exploring the content and the recorded videos, even beyond the face-to-face mode for better understanding.**
- **Learners access the course content and respond to the interactions with the teacher and their peers, according to their ability to complete the tasks within the scheduled time.**
- **Learners interact with each other and participate in the discussions as per their convenience to reflect their learning.**
- **A large group of learners can participate in the discussion, ask questions and post comments.**

- **Learners feel isolated and distracted as they are not in direct contact with their teachers and peer group.**
- **Learners need motivational skills to do their work in scheduled time**
- **Learners generally develop a tendency of delaying their tasks.**
- **Learners need a high level of commitment and independent learning skills.**

Now, the question arises of which mode of teaching and learning is most suitable and

why. We need to teach the learners by synchronising both synchronous and asynchronous modes of teaching and learning, also called collaboration.

We need to collaborate on both modes of teaching. One must collaborate on teaching and learning modalities for better communication and interactions. Anderson (2004) states that learning occurs through interactions between pupil, teacher, content, and communication tools. Both synchronous and asynchronous modes can be used to assist learning, interactions, and collaboration:



Anderson, in 2004, referred to online learning as an asynchronous mode, where a single teacher caters to the needs of students with diversity. Thus, students at different locations in different time zones are taught at a time through videos, texts, audio, etc. He further mentioned that this can widen the gap between teacher and learner, who can be overburdened with questions, and learners, in return, will get a delayed response.

Tegn and Taveras 2005, found that working purely through an asynchronous environment will lead to isolation and social disconnect among learners. Wiljekumar and Spielvgel (2006) added that such a learning environment can take away student's creativity as they will have access to readymade posts made by others, which can, in turn, take away their ability to think critically or analyse. Unlike traditional distance education, Ellis and Romano (2008) noted that a collaborative environment would minimise isolation. This thought was further supported by (Murphy and Coffin, 2003 Pullen and Snow, 2007 Giesbers et al., 2013 and Oztok et al., 2013). The blend of synchronous and asynchronous modes provides a better environment for students to collaborate.

Johnson (2006) specifies that using synchronous and asynchronous modes together makes complete sense because synchronous communication tools greatly benefit the social processes involved in learning, while asynchronous discussion may best support the development of higher-level thinking skills.The studies above are further supported by the author's study,"A comparative study of student's perspective about the asynchronous and synchronous mode of e-learning of college-going students," which found a substantial difference between the asynchronous and synchronous modes. Students responded that synchronous interaction should be integrated with the asynchronous online learning mode.

6.1.4: COMPUTERS AND THE INTERNET IN TEACHING AND LEARNING

Computers and the internet have significantly transformed education and learning. Let us delve into how these digital technologies have impacted the way we learn and teach:

1. **Early Use of Computers in Education:**
   - Initially, educators used computers to deliver online tutorials, administer drill-and-practice exercises for rote skills, and create supportive environments for exploring ideas through programming.
   - Computers served as dynamic audio-visual resources, enhancing the learning experience.
2. **Interactive Simulation Games:**
   - Today, interactive simulation games allow students to learn by taking actions within specific scenarios.
   - These games engage learners and provide practical experiences beyond traditional classroom settings.
3. **Presentation Aids**:
   - Tools like PowerPoint and Prezi have replaced traditional blackboards.
   - These presentation aids help educators convey concepts more effectively, making learning engaging and visually appealing.
4. **Smart Classrooms**:
   - Smart classrooms provide instructors and students with technology that facilitates learning.
   - Interactive displays, digital whiteboards, and collaborative tools enhance teaching.
5. **Inverted Classrooms**:
   - Inverted classrooms flip the traditional model by having students prepare for lectures in advance.
   - Classroom time is then used for interactive discussions and collaborative activities.
6. **Intelligent Tutors**:
   - Artificial intelligence (AI)-based intelligent tutors actively support student learning.

- They diagnose difficulties, adapt tutoring strategies, and provide personalised guidance.

7. **Online Learning and MOOCs**:
    - Online learning has opened up new opportunities for adult and continuing education.
    - Students can learn at their own pace, anytime and anywhere.
    - Massive Open Online Courses (MOOCs) have created worldwide learning communities.
8. **Debates and Challenges**:
    - Despite technology's positive impact, debates persist on its extent and appropriate educational use.
    - A common dilemma is whether to allow or restrict mobile phones and other devices in classrooms. Computers and the internet have revolutionised education, offering diverse tools and methods to enhance learning experiences.

6.1.5: WEB-BASED TECHNOLOGIES

The educational system is in a transition stage, brimming with potential. To meet the challenges of expansion and cater to individual needs, it embraces new technologies and explores new paths to provide quality educational opportunities for all. Despite factors like deficient budgets and lack of facilities, the system is not ready to abandon the traditional modes of knowledge transfer, recognising the value of face-to-face interaction. Even the students, when asked about their preferred teaching mode, were evenly divided between traditional classroom teaching and ICT-supported teaching, showcasing the potential of both approaches.

Despite its shortcomings, the traditional teaching mode provides a much-needed human touch to teaching-learning. The teachers' personalities and behaviours directly influence the students' blooming personalities. Only face-to-face interaction meets affective, cognitive, and psychomotor objectives. The traditional face-to-face approach helps develop a robust value system. Social skills like cooperation, sharing, expression and respecting other's views are more easily created in a conventional teaching mode. Students learn not only from books or teachers teaching inside the classroom but also from their co-students; through peer group interaction, they learn many skills in the playground and small social interactions in canteens, lounges, etc. All this is necessary for proper personality development.

As discussed above, the traditional approach has its benefits but is not free from deficiencies. It has the following shortcomings:

- ❖ It fails to meet the individual needs of all the students in the class due to improper pupil-teacher ratio.
- ❖ It is not adapting to the challenge of physically teaching physical students.
- ❖ Teachers are not trained for integrated classrooms.
- ❖ It is not fit to meet the challenges put forward by the irregular students as attendance is a must, and the evaluation system depends on the annual examination. If students fail to take the examination, a whole year is a waste; due to rigidity, the irregular students are, in a way, excluded from the mainstream of the school system.
- ❖ Similarly, in the absence of professional counsellors, the right attitude of teachers, and a dearth of school activities, children who continue to school for any reason do not get a chance to enter the formal educational system.
- ❖ School cannot reach every child, so education is still a far-sighted goal.
- ❖ Children from deprived groups, from the areas that are geographically isolated and medically unfit students, are not able to gain benefit from this formal traditional mode of teaching.
- ❖ At the same time, students suffer from the dearth of teachers; their learning is ambiguous due to inefficient teachers.
- ❖ Courses are not regularly revised, books are not updated, and teachers are not interested in upgradingknowledge and professional skills; the result is that our students are not well prepared to meet the demands of the modern market and professions.

A supported teaching-learning process is a good option for making their knowledge correlate with technological advancement and globalisation, minimising teaching errors, improving quality, and increasing students' exposure. ICT-supported teaching provides a new dimension to the teaching-learning process, introduces students to the vast pool of knowledge and opens innumerable opportunities to learn, unlearn and relearn. All learners, whether in-service or physically challenged, can benefit from this teaching mode. It helps to reach all students. In the words of Swami Vivekanand, "If people cannot reach school, schools should reach them" ICT-supported learning is precisely doing the same.

Analysis of both the traditional mode of teaching-learning process and the supported teaching-learning process shows that both have a few merits and demerits; both cater to

different needs, demands and expectations from the educational system, so the solution is to provide and design such a system that is based on an integrated approach, a system that incorporates the main features of both traditional approach of teaching and ICT supported teaching. Today's demand is an approach that blends the advantages of both modes for the student's learning, i.e. blended learning.

6.1.5.1: BLENDED LEARNING

The main features of blended learning are-

- Students have the option of the two modes: Students in blended learning can select either the traditional mode of classroom teaching, where they can interact with the teacher and their classmates, or they can choose ICT-supported teaching-learning. This largely depends on the nature of the content and objectives being targeted. Sometimes, course designers or teachers themselves decide on the mode appropriate for the topic being dealt with.
- Teachers are well-versedin both modes. It is an essential feature of blended learning that teachers are very dynamic, techno-savvy, and fully trained to work efficiently in both the traditional classroom format and the ICT-supported format. They will be well-equippedto use traditional methods and other modern technologies.
- Students get face-to-face interaction and virtual space—Students get ample time to interact with other students pursuing the same course. They can interact with them inside the college campus and virtual space. Thus, their group becomes very large and diverse. Hence, the students' knowledge becomes wide, and they also develop a feeling of understanding, love, and harmony with students of other cultures and countries.
- Students get a whole experience using new technology- the present century is the century of ICT. Today, the illiterate are not only the ones who cannot read and write; a person not well versed with modern technologies is also illiterate. Today, all professions demand expertise in ICT, so blended learning helps to enrich students' ICT experience. Students involved in blended learning gain the capability to exploit available technologies to the fullest of their benefit.
- Students learn different life skills to lead a happy, peaceful, and successful life. The significant life skills are empathy, decision-making capability, love, patience, communication, self-management, and critical thinking. Blended learning helps the students to practice these skills. Students get acquainted with a few skills like

love, empathy, and patience in the classroom through their teachers and classmates, and a few skills like self-management, decision-making, critical thinking, and communication through online experiences.

- ❖ All-round development of personality is targeted. In blended learning, the students get the full opportunity for all-roundpersonality development. All the aspects of personality, namely- cognitive, physical and emotional, are developed through blended learning, which is difficult to achieve in traditional mode or ICT approach if followed in isolation. Traditional classroom teaching is helpful in memory and understanding levels of education, so it helps in cognitive domain development.At the same time, the teacher's behaviour, playground experience, and social grouping with classmates develop affective and physical domains. At the same time, online experiences help in a reflective level of learning, so developing higher faculties of min and social networking sites and other social interactions through the internet helps in proper value development.
- ❖ Physical development is possible within school campuses. Online learning and ICT support teaching-learning and are often blamed for ignoring students' physical development. Blended learning overcomes this limitation. It also includes school experience, so students get time for playing, physical work, and yoga on campus.
- ❖ Students get broad exposure and new perspectives of the course content through various experiences. Their content knowledge is enriched, and they see various new dimensions of the content and gain practical,valuable knowledge.
- ❖ It has a human touch—due to the physical prescience of the teacher, students get that human touch via the traditional approach, which is necessary for balancing the student's emotional quotient and is very necessarily up to the secondary level.
- ❖ It provides a multicultural and multidimensional approach to the teaching-learning process. This blended learning approach allows students to communicate and share their views and feelings with students worldwide. Thus, it makes the teaching-learning process multicultural, and the variety of experiences brings with it the interdisciplinary and multidimensional factor.
- ❖ Blended learning makes the teaching-learning process child-centred. It is designed to provide maximum gain to students and thus reach the goal of child-centred education.
- ❖ Diverse roles of teacher—The teacher in blended learning plays different roles. The traditional role of a teacher in the classroom is as a motivator, a resource person,

an organiser, a developer when she develops content to be provided through ICT, and a guide on the side. Thus, teachers are free from monotonous traditional roles and can try their hands in diverse areas that are good for their professional growth.

- ❖ Students construct knowledge rather than just consuming it. Blended learning also includes constructivism. Students build their understanding rather than depending on others to design teaching-learning strategies.

Prerequisite of Blended Learning

Implementing blended teaching is not easy. It requires specific fundamental preparations in all the elements of the teaching-learning process—teacher, student, content designer, and infrastructure. The following are the basic requirements for implementing successful blended learning.

1. Well-trained teachers- through child-centred teachers- are essential to blended learning. Teachers should be well acquainted with the concept of blended learning and fully trained and skilled to blend both types of approaches- traditional and technological. They should be trained to develop content in digital form so that it can be available to students online. They should be well versed in internet browsing and terminology and be aware of all the websites that can be useful for the students while learning online. Teachers should know how to utilise blogs, YouTube facilities, software like Skype, Google Talk and others for video conferencing and social networking sites for educational purposes.
2. Teachers with a scientific attitude must have a scientific attitude. They should have good observation skills, they should be optimistic, and they should have problem-solving skills. A scientific attitude will help the teacher deal positively with failures they will encounter while working on this innovative concept and help analyse the conditions objectively. This right type of scientific temper will automatically filter from teachers to students
3. Teachers with a broader outlook and positive approach towards change are essential for the success of any innovative idea or method. The blended learning process also needs teachers who have a broader outlook and are flexible. They should be ready to accept changes andbe innovative and dynamic.
4. Complete facilities like a well-furnished computer lab, internet connection, and provision for video chatting are compulsory factors of blended learning. Blended learning largely depends on infrastructure. A school should not only have good classrooms. However, it should also have well-furnished computer laboratories with

sufficient computers to cater to all the students of one class, an internet facility, and a Wi-Fi campus, if possible.

5. Students have access to the internet on their private computers- in addition to the school having a fully ICT-friendly campus, students should have essential hardware support to learn online and offline at their residences. This requires a positive attitude and good investment schemes from the government.
6. Flexibility in the system—The system should have a flexible timetable and examination system. All this is crucial for implementing blended learning.
7. Fully aware and agreed on Parents- the parents should be made well aware of this innovative approach to teaching so that they are ready for it and support their wards for blended learning and can accept that this deviation from traditional teaching is beneficial for their children
8. Formative evaluation and continuous internal assessment—The school authorities and higher educational bodies should be ready to implement continuous internal assessment (CAI) and other formative evaluation tools completely, as summative evaluation is not supported in blended learning. Provisions should be made for online examinations to make the system more flexible.

These are a few essentials and basic requirements without which blended learning cannot be executed successfully.

Advantages of Blended Learning

Blended learning has the following advantages-

- As part of learning is done through ICT, online or offline, teachers and students get more time in the classroom for creative and cooperative exercises.
- Students gain the advantage of online learning and CAI without losing the social interaction element and human touch of traditional teaching.
- It provides more scope for communication. Blended learning completes the communication cycle, which is impossible if we follow only the traditional approach.
- Students become more techno-savvy, and they gain enhanced digital fluency.
- Students have strengthened professionalism by developing self-motivation, self-responsibility, and discipline.
- It updates course content and so gives new life to established courses.

❖ **Activity-based learning**

Learning climate plays a vital role in students' learning. A favourable climate creates a feeling of being understood and a feeling of group cohesiveness and safety in students, which fosters the learning process.

❖ **To createa positive learning climate in person for the students before the blended learning practice starts,the teacher will:**

1. Explain the rationale for using blended learning.
2. Give orientation about blended learning practice.
3. Explain the role of students.
4. Conduct ice-breaking activity.
5. Introduce students to the teaching and non-teaching staff of the institute.
6. Conduct workshops to give students technology training. This training will also include the objectives of developing netiquette and awareness about cybersecurity.
7. Invite 2-3 past students of my institution and allow the students to share their experiences with students about blended learningin the absence of the teacher.

❖ **To createa positive learning climate online for the students, the teacher will:**

1. Post the video explaining the rationale and role of students.
2. Introduce students to the course facilitators.
3. Conduct online classes for orienting students about the technology used in the blended learning program.
4. Create an activity, 'introduce yourself'.
5. Post the testimonials (video clips) of previous students sharing their experiences.
6. Create a forum for helping them with technology-related problems and courses.

6.1.5.2: VIRTUAL LEARNING

Virtual learning, or online learning or e-learning, is an educational approach that leverages digital technology to deliver instruction remotely. It has gained prominence in recent years due to advancements in internet connectivity, multimedia tools, and the need for flexible learning options. Let us explore the key aspects of virtual learning:

1. **Definition and Types**:

- **Virtual Learning**: Refers to any form of education delivered via digital platforms, allowing learners to access content, interact with instructors, and collaborate with peers online.
- **Synchronous Virtual Learning**: Real-time interaction between instructors and students, often through video conferencing or live chat sessions.
- **Asynchronous Virtual Learning** is self-paced learning in which students access pre-recorded lectures, discussion forums, and assignments at their convenience.

2. Benefits:

- **Flexibility**: Learners can study from anywhere, eliminating geographical constraints.
- **Personalisation**: Tailored learning experiences based on individual needs and preferences.
- **Cost-Effective**: Reduced expenses related to travel and physical infrastructure.
- **Access to Resources**: Students can explore digital resources, including videos, articles, and simulations.

3. Challenges:

- **Technical Requirements**: Reliable internet access and familiarity with digital tools are essential.
- **Lack of Social Interaction**: Virtual learning may lack face-to-face interactions in traditional classrooms.
- **Self-Discipline**: Students must manage their time effectively to succeed in asynchronous courses.

4. Best Practices for Success:

- **Create a Study Schedule**: Allocate specific times for learning and stick to them.
- **Participate Actively**: Engage in discussion forums, virtual group projects, and live sessions.
- **Stay Organized**: Keep track of assignments, deadlines, and course materials.
- **Seek Support**: Reach out to instructors or fellow students when needed.

5. Prominent Platforms:

- Coursera: Offers a wide range of courses from universities and institutions worldwide.

- BitDegree: Provides interactive courses on various topics, including programming and technology.
- Tamil Nadu Virtual Learning Portal: A platform for skill development and career enhancement in Tamil Nadu.

Therefore, virtual learning is a powerful tool that empowers learners to acquire knowledge and skills in a flexible and accessible manner. Whether pursuing a degree, enhancing your professional skills, or simply exploring new subjects, virtual learning offers exciting opportunities for growth and development.

6.1.5.3: FLIPPED CLASSES

Like blended learning, a flipped classroom is also a teaching approach which seeks to enhance a learner's commitment, knowledge, and learning through comprehensive analyses at home or work on current problems and solutions during the face-to-face classroom.

A flipped classroom is a type of blended learning in which students are introduced to content at home and practice working through it at school. This is the reverse of the more common practice of introducing new content at school and then assigning homework and projects to be completed by the students independently at home.

We know that in face-to-face teaching, the teacher dominates in the classroom while sharing information. The teacher remains active, delivering content-based lectures, and controls the class, making students passive and the class monotonous. In a flipped classroom, the activities dominate and overpower the traditional homework. The students attend online lectures, watch videos, join groups in online interactions, and analyse research problems at home while participating in classroom notions under their teacher's mentorship. Therefore, each context's actions, activities, and events differ from traditional ones. The 'flipped' class provides ample space for teachers and students to be more dynamic, encouraged, vibrant, and participative in a more personalised but motivated manner.

6.1.6: LET US SUM UP

The Indian education system is suffering from various problems like failing to expand the system to provide provision of free and compulsory education to all children, abating to maintain quality along with increasing the quantity, education curriculum is not able to meet demands of the international market and not even able to conserve and propagate Indian value system, teachers are not entirely dedicated towards their profession and teacher's

inefficiency is adversely influencing the learning of the students. There is an urgent need for radical steps and major revolutions to overcome the challenges. To some extent, blended learning will help solve these problems of the Indian education system.

Due to our country's large population, the formal school system cannot provide equal educational opportunities to all, so blended learning will be a good option as it will make the area of educational opportunities more comprehensive and allow education to reach more children. Technological and scientific development continuously demands the education system to match their pace and correlate with them so students can cope with the fast-changing market. Technology and the scientific field are most dynamic and evolving rapidly, incorporating innovations, so the content transmitted to students has to be revised accordingly. In India, courses are generally not so frequently revised and updated, so if blended learning is adopted, students and teachers can easily update their knowledge and skills.

Implementing blended learning requires complete dedication on the part of educational authorities and the management of educational institutes. It requires a well-planned design that includes everyone from top to bottom of the educational hierarchy. To prepare educational institutes for blended learning, we will need to increase educational budgets; this can be done with the help of NGOs and by coordinating with the industrial and corporate sectors. These sectors can be motivated to provide their financial input for blended learning execution. These sectors will benefit the most if the output from these educational institutes is more efficiently groomed for the global market. The other fundamental issue that must be considered is the development of the right attitude towards this ground-breaking concept in all those concerned with the educational system. For changes in attitudes of parents, community, teachers, and students, awareness programmes, seminars, and discussion forums should be organised. These can be utilised to make people aware of the benefits of blended learning so that the right mindset is prepared for its implementation. Mass media can well be utilised for this purpose. Teacher training programmes, both in-service and pre-service, must be reoriented to prepare teachers for a blended learning approach. The finance and efforts for various projects to meet education for all should be re-directed in preparing our primary schools for blended learning as it will cater to many problems simultaneously, and both finance and efforts are more fruitfully utilised.

To conclude, blended learning is, to some extent, the solution to problems prevailing in our educational system. If implemented in a well-planned, organised way with the right attitudes, it can become the future of our educational system. To our benefit, steps for adapting blended learning will soon be initiated.

6.1.7: ASSIGNMENT

1. Define the concept of ICT and its uses in Education.
2. Note down the inter-relationship between ICT and Education.
3. Differentiate between Blended Learning, Virtual Learning and Flipped Classes.
4. Describe the different ways of using ICT in Education.

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BLOCK- 6
ICT in Education

Unit-2
ICT in Teaching

CONTENT STRUCTURE

6.2.1: INTRODUCTION

When I see the power that technology gives us in terms of the newways of collaborating and sharing and the quality of the resourcesthat people are sharing, I think it's just changing everything. (Tinney,2013)

The purpose of this unit is to describe how digital technologiesand educational strategies can be used to design, facilitate, anddirect collaborative communities of inquiry. We begin this unit with an overview of cooperative learning, followed by descriptionsof how various technologies can design, facilitate,and direct a blended learning environment in higher education.Sustained collaboration in constructing and confirming knowledge represents a new era in educational practice. The NewMedia Consortium and the Educause Learning Initiative's 2010Horizon Report (Johnson, Levine, Smith, & Stone, 2010) identifieshow the "work of students is increasingly seen as collaborative bynature . . . the emergence of a raft of new (and often free) tools hasmade collaboration easier than at any other point in history" (p. 4).They identify collaboration and communication as a significanttrend in expanding the possibilities for learning and creativity. A a significant driver of this transformation in learning has been theemergence of social media technologies.

These technologies present exciting opportunities, but thechallenge is understanding the educational design and pedagogical issues associated with using social media tools, such as blogs, wikis, online communities and synchronous communicationtechnologies (e.g., Adobe Connect). The true potential of thesetools is in the design, facilitation, and direction of synchronous and asynchronous communities of inquiry that support worthwhileeducational goals and higher-order learning activities.We believe that all of education is experiencing a transformativeshift from issues of accessing and sharing information to designingcommunities of inquiry where participants are actively engaged indeep and meaningful learning. Social media applications are aboutusing the Web to capitalise on its greatest asset: bringingpeople together in learning communities where participants(students and teachers in the case of education) with a commoninterest can interact and collaborate on purposeful activities.

Brownand Adler (2008) argue that social media tools' capabilitieshave "shifted attention from access to information toward access topeople" (p. 18). These applications allow people to come together incollaborative learning communities.

6.2.2: OBJECTIVES

After going through this Unit,learners will be able to -

- ❖ Define the concept of online learning.
- ❖ Define the Bichronous modes of teaching and learning.
- ❖ Differentiate between synchronous, asynchronous and bichronous modes of online teaching.
- ❖ Elucidate the need for teachers' professional development to use ICT.
- ❖ Illustrate the different ways of using ICT in Education.
- ❖ Identify the challenges of online teaching and learning.

6.2.3: ONLINE TEACHING AND LEARNING

In the previous Unit (Block 6, Unit 1), we discussed blended learning and flipped classroom, in-class and out-of-class integration. However, suppose we thoroughly discuss blending synchronous and asynchronous modes, 100% online learning, using all technology-integrated collaborative elements. In that case, a new technology, named Bichronous mode, will be more helpful and valuable in the fully online teaching environment.

During Covid-19, everyone shifted towards a fully online mode. So, several teachers teach online using synchronous and asynchronous modes because one teaching mode is insufficient to get the maximum output of learners. Martin and Oyazun 2018 mentioned that in the asynchronous mode of online learning, the content is delivered online, and learners join at their convenience concerning time and place in the program or course, and synchronous online learning, the content is delivered online, and learners attend lectures in the real-time settings in any place, but at similar times along with other learners and the teacher (Martin et al.,2020)

INTEGRATION OF BOTH:

ASYNCHRONOUS (fully online) + SYNCHRONOUS (fully online) = BICHRONOUS

Bichronous online learning is the blending of both asynchronous and synchronous online learning. During the asynchronous parts of the course, learners can participate anytime, anywhere, but they must then participate in real-time activities for the synchronous sessions. The amount of the online learning blend varies by course and the activities included in the course.

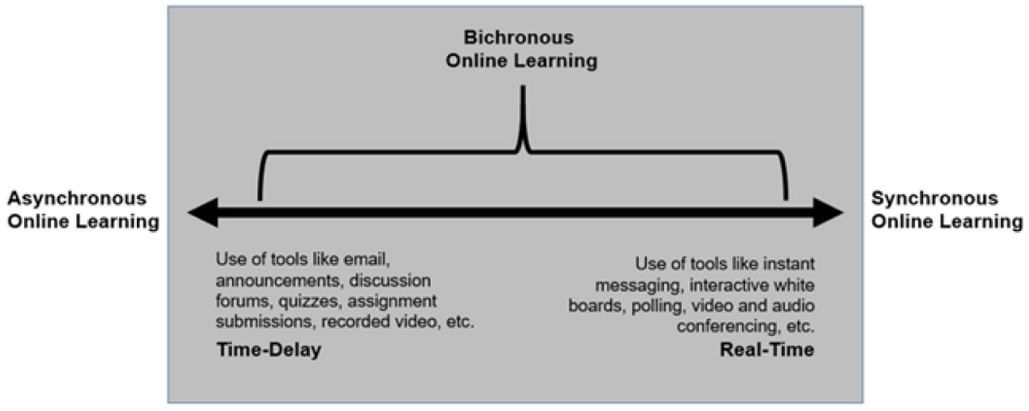


Image: Conceptual model for Bichronous online learning (Martin et al., 2020, p.1)

❖ **Difference Between Types of Online Learning (Martin, Polly & Ritzhaput, 2020)**

❖ **Difference Between Types of Online Learning (Martin, Polly & Ritzhaput, 2020)**

Types of Online Learning → / Elements ↓	**Asynchronous** (100 percent asynchronous)	**Synchronous** (100 percent synchronous)	**Bichronous** asynchronous + synchronous
DEFINITION	Convenient with time, place in online learning	Pragmatic online learning in which learners take part from any place or location.	Blends both online learning types, where learners take part conveniently at any time, location or place in learning during the asynchronous fragments of the course but contribute in the activities in the synchronous sessions at the same time.
ADVANTAGES	Learning at individual speed No planned conflict	• Instant feedback • Augments collaboration • Audio-visual communication • Greater responsibility • Opportunity to organize time and efforts • Stay engaged and encouraged on task	• Instant feedback • Learning as desired • Better opportunities for discussions • Better prospects for audio-visual communication
LIMITATIONS	• Delayed in time • Lacking of immediate feedback • Lower level of participation	• Planned conflict in arrangement of activities • Access to internet at the specific times • Prospects of technical glitches • Speedy Interactions	• Planned conflict • Probability of technical glitches

❖ **Reflection on Online Distractionsand Interactions**

In India, learners from remote areas face many problems due to technical difficulties, i.e. issues of electricity and speed and internet accountability. Learners even feel isolated because of a lack of motivation and irregular online communications.

Due to passive involvement in online activities, learners cannot manage their time correctly and cannot adapt to the online environment. All the distractions adversely affect the learner's self-confidence. The problem can be resolved by setting proper goals and by giving rewards. The teacher needs to motivate the learners by giving timely feedback and staying connected with the learners collaboratively by using various online synchronous and asynchronous software. Teachers and learners need to interact with each other to reduce isolation. Teachers should also help learners take technical issues by providing timely assistance and tutorials wherever needed.

6.2.4: INSTRUCTIONAL DESIGN

Design is a planning process considering many content and process issues related to the intended learning outcomes. The planning process described here is shaped at the conceptual level by assumptions, principles, and purposes. Design begins before course commencement with a holistic perspective describing the assumptions and approaches to learning. This provides a framework for principles and guidelines that shape the design process of choosing content, creating student learning activities of collaboration and interaction, and identifying assessment procedures.

Thoughtful **instructional design** is guided by this framework, which provides direction regarding content and process decision points. This broad approach is essential; simply focusing on content provides little direction concerning constructing knowledge. The design will have a pragmatic impact on how students approach learning (Garrison & Cleveland-Innes, 2005). The planning process is further shaped at a practical level by educational and technical possibilities and constraints. Paying attention to these conceptual and practical elements is another challenge in design. The goal is to find a solution with the slightest compromise to a collaborative community of learners engaged in purposeful educational activities. The design approach described in this unit focuses on academic goals and strategies and lets them determine the instructional technologies that are possible and appropriate for the purpose. The design process is to align the goals of education with the properties of the technology.

✓ Flexibility is a crucial design consideration. In an educational context, design is a process that constructs a flexible plan that must be open to the unexpected and allow for

a change of direction while staying within the parameters of the educational goals. Design must not be deterministic and rigid. Design is shaped by instructional theory, but evolving conditions during implementation necessitate instructional decisions. The design adjusts as circumstances change (as they inevitably will) and expectations are negotiated. As such, design and implementation must not be separated. Design continues during the implementation phase. The instructor is also a course designer (unlike the industrial approaches of mega-distance education institutions), necessitating that an instructor has both content and pedagogical expertise.

✓ An instructional design should be a vital resource, yet one that is open to modification by an instructor with the experience and judgment to achieve the intended educational goals efficiently. We recognise that what is learned is inseparable from how it is learned. Theissue (as it has always been in higher education) is to design theeducational transaction that will engage learners in purposeful andcollaborative activities that support discourse and reflection. Technology is an enabler in this regard; instructional design that fosters collaborative engagement is the first challenge to achieving worthwhile educational processes and outcomes.

6.2.5: ICT FOR PROFESSIONAL DEVELOPMENT OF TEACHERS

ICT (Information and Communication Technology) plays a crucial role in the continuous professional development of teachers. Let us discuss some key points:

1. **UNESCO's ICT Competency Framework for Teachers (ICT CFT)**:

- ❖ The **ICT CFT** is a comprehensive framework forpre-and in-service teacher training on digital technologies.
- ❖ It covers formal and informal education systems, from K-12 to tertiary levels.
- ❖ The framework identifies **18 ICT competencies** that teachers should aspire to achieve. These competencies are grouped into **64 specific objectives**.
- ❖ The competencies cover various areas, including understanding national priorities, curriculum integration, assessment strategies, pedagogy, school administration, and ongoing professional development.

2. **Empowering Teachers Through ICT**:

- ❖ **ICT** has become a catalyst for empowering teachers through **Continuous Professional Development (CPD)**.

- ❖ By embracing the digital revolution, educators can enhance their skills, connect with a global community, and foster a lifelong love of learning.
- ❖ The integration of **ICT** in **CPD** is not just a trend; it is a necessity for the modern educator.

3. Teacher Training and ICT:

- ❖ Teachers need specific professional development opportunities to increase their ability to use **ICT** effectively.
- ❖ Such training should focus on formative learning assessments, individualised instruction, accessing online resources, and fostering student interaction and collaboration.

In summary, **ICT** empowers teachers with the necessary skills to navigate the digital landscape and enhance their teaching practices. Educators must stay updated and embrace technology in their professional development journey.

6.2.6: WAYS OF USING ICT IN EDUCATION

Tim O'Reilly (2005) is credited with coining the term Web 2.0 to describe the trend in Web technology and design that aims to enhance creativity, information sharing, and, most notably, collaboration among users. Recently, this concept has been defined as social media: "a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0" (Kaplan & Haenlein, 2010, p. 60). These applications can be used to support collaborative learning in a variety of formats. For example, social bookmarking applications can share personal collections of Web-based resources to complete group projects. Blogs can facilitate student self-reflection and peer review of course assignments. Students can use wikis to summarize course discussions collaboratively, refine research papers, or even co-create online books.

Social networking systems (SNS) such as Facebook and LinkedIn can be used to extend the boundaries of the classroom to create online communities and discussions and debates that include past students, potential employers, and subject matter experts. Audio, graphic, and video files can now be created and shared through social content applications such as PodOmatic, Flikr, and YouTube.

These files and other data sources can be recombined to create new meanings and interpretations using mashup applications such as Intel's Mash Maker and Yahoo Pipes. Synchronous communication technologies such as Skype and Adobe Connect allow students to communicate and collaborate outside the classroom in real time.

Moreover, virtual world applications such as Second Life provide opportunities for rich synchronous interaction in 3-D immersive worlds to support collaborative and creative project-based work. We will now examine how the following eight categories of social media applications can be used to design, facilitate, and direct collaborative learning activities in blended courses and programs.

1. Social Bookmarking
2. Debates
3. Individual and Group Projects
4. Blogs
5. Self-reflection
6. Peer Review
7. Wikis
8. Course Notes
9. Online Discussion Summaries
10. Course Wiki Textbooks
11. Social Networking
12. Study Groups
13. Online Discussion Board
14. Pre-class Activities
15. Social Content
16. Learning Objects
17. Individual Presentations and Group Workshops
18. Mashups
19. Analysis of Class and Online Discussions
20. Digital Storytelling
21. Synchronous Communication and Conferencing
22. Virtual Worlds

1. Social Bookmarking

The general idea behind social bookmarking is that, rather than saving a bookmark for a Web page in a browser such as Internet Explorer or Firefox, users save the bookmark to

a publicly accessible website (e.g., delicious.com). Other people can then see the bookmark and, ideally, be exposed to something they would not otherwise encounter. In addition, some social bookmarking sites also employ a voting system that allows users to indicate what bookmarks they find interesting (e.g., reddit.com). As a bookmark receives more and more votes, its prominence on the website increases, attracting more and more votes. The ultimate goal is to have the bookmark appear on the home page of the social bookmarking site.

This ability to share and build upon the resources of others can help to develop relationships between concepts and people in a higher education course or program. Social bookmarking applications can be used for student-generated course reading lists, debates, and individual and group projects. Course reading lists and assignments. For example, rather than having a predetermined reading list, at the beginning of each semester, an instructor could assign student groups to find resources related to specific course concepts or issues. These resources can be shared and annotated using a social bookmarking tool like diigo.com (Figure 6.1). These resources can also be used for pre-class reading assignments. Traditionally, this activity involved a reading from the course textbook.

Social bookmarking systems such as citeULike and Edtags can now provide students access to relevant, engaging Web-based articles and resources. Despite the ability to access relevant learning material quickly, the common challenge is getting students to engage meaningfully in pre-class activities. Novak, Patterson, Gavrin, and Christian (1999) have used a survey or quiz tool to create triggering events for students before a synchronous session. They have coined the term Just-in-Time Teaching (JiTT) to describe getting students to read a Web-based article and then respond

to an online survey or quiz shortly before a class. The instructor then reviews the student submissions "just in time" to adjust the subsequent class session to address the students' needs identified by the survey or quiz results. A typical survey or quiz consists of four concept-based questions, with the final question asking students: "What did you not understand about the required reading, and what would you like me [the instructor] to focus onwithin the next synchronous session?"

2. Debates

Educational research has demonstrated that in-class and onlinedebates are effective ways to engage students in deeper approachesto learning (Kanuka, 2005). Students can use social bookmarking applications such as Social Bookmarking to collect and annotateresources for debate activities.For example, in a blended course, student teams could beassigned to collect resources that support a particularposition or ideology outside of class time.

During class, studentscan then be asked to take the opposite side of the debate and prepare their arguments using the resources collected by the other student teams.

3. Individual and group projects

Social bookmarking systems such as Delicious enable studentsto create their own libraries to sharewith their colleagues. The advantage of using such a service is thatstudents can continually build and share their resource collectionsthroughout their university experiences. This allows thestudents to make intentional connections between projects andassignments they complete in different courses.

4. Blogs

A blogis a Web-based personal journal with reflections, comments, and often, hyperlinks to other blogs that the author of the site visits regularly (Downes, 2004). To receive automated content updates, people can subscribe to blogs using a Really Simple Syndication (RSS) feed.

Blogging can provide students with opportunitiesto receive external feedback and contribute to the dialoguesin their fields of study. In blended learning courses, blogscan support self-reflection and peer review of courseassignments, allowing students to take a deeper approach to theirlearning by going public with their work (Vaughan, 2008).

5. Self-reflection

At the beginning of the semester, an instructor can require eachstudent to create a blog using applications such as Blogger andWordPress. Students can use these blogs to document their learning

growth and development throughout the term. For example, duringthe first week of classes, students post an initial journal entry abouttheir personal learning goals for the course and what they thinkthey already know about the course concepts. Then, at the end ofthe course, students create a final journal entry that reflects on whatthey have learned and how they have changed, grown, and developedthroughout the course.

Blogs can also be used to get students to self-reflect abouttheir course assignments. The purpose of these entries is to havestudents intentionally reflect on what they learned while completing the assessment activity and how they couldapply this learning to their future course studies or careers. The followingquestions can be used to guide this activity:

1. What did you learn in the process of completing thisassignment?

2. How will you apply what you learned from thisassignment to the next class assignment, other courses,and your career?

6. Peer review

A peer review process can also be supported through blogs. Students can post drafts of course assignments to their blogs, and then their peers can review these documents and post commentsto the author's blog. Guiding questions for this peer review process could include:

1. What did you learn from reviewing this document?

2. What were the document's strengths (e.g., content, writing style, format, and structure)?

3. What constructive advice and recommendations could you provide for improving the quality of this document?

7. Wikis

A wiki is a collection of web pages that anyone can edit at any time and from anywhere. The possibilities for using wikis as a platform for collaborative projects are limited only by one's imagination and time (Leuf & Cunningham, 2001). Students can use wikis collaboratively in blended learning courses to create course notes, online discussion summaries, group essays, and even course textbooks.

8. Course notes

Many higher-education students now bring laptop computers to class, and wiki applications such as Google Drive and Titan Pad can co-construct course notes.

This can be an individual activity, or the instructor can assign student teams to create notes for specific class periods. The advantage of using an application such as Titan Pad is that students can work simultaneously on the same document without overwriting each other's work. Students can also assign a specific text colour to their Wiki contributions to keep track of their work.

9. Online Discussion Summaries

Student-moderated online discussion forums can promote individual reflection and critical dialogue between face-to-face sessions in a blended learning course. For example, at the beginning of the semester, groups of students (three to five) can self-select a topic related to key course concepts and issues. Each group is responsible for moderating and summarising their selected online discussion for a set period (often one or two weeks). Students can

use Garrison, Anderson, and Archer's (2001) practical inquiry model as a guide to create reflective discussion summaries.

For example:

1. Triggering events – What were the key questions identified in this class?
2. Exploration – What opportunities and challenges were discussed?
3. Integration – What recommendations and conclusions can you draw from the discussion?
4. Resolution/application – How can we apply this discussion's "lessons learned" to our class assignments and future career plans?
5. What key resources (e.g., websites, articles, books) could we use to find further information and ideas about this topic?

A wiki can then be used to draft notes and a final summary (synthesis and analysis) of the online discussion based on these questions or additional guidelines that are co-created by the students and the course teacher (see Figure 6.3). Wikis can provide a collaborative workspace for students to construct group essays. The advantage of using an application such as Google Drive is that students can access these group documents from any computer or mobile device with Internet access. Students can easily edit and revise each other's work without softwareor computer platform compatibility issues (e.g., Mac versusPC). The finished product can then be exported in various formats (e.g., PDF, Word, and HTML) and submitted for either peer orinstructor assessment.

10. Course Wiki Textbooks

The potential also exists for students to use wikis to co-createcourse textbooks. There are numerous examples of such textbookson the Wikibooks site. Wiki textbooks can be created and developedin a variety of ways. For example, student groups can be assigned todevelop new book chapters, while other groups can be giventhe task of peer review and editing existing book chapters.

11. Social Networking

Social networking systems (SNS) allow users to share ideas, activities,events, and interests within their networks.This can lead to online communities of peoplewho share common interests and activities. In blended learningcourses, applications like Facebook and LinkedIn can be used forstudy groups and online discussion board activities.

12. Study Groups

Several educational research studies have been conductedover the years that have demonstrated that, regardless ofthe subject matter, students working in small groups tend to learnmore of what is taught and retain it longer than when the same contentis presented in other instructional formats (Beckman, 1990;Chickering & Gamson, 1991; Johnson et al., 1991;McKeachie et al., 1986). Many students inhigher education today commute to campus and are therefore challengedto find the time and the location to work in study groupsoutside of class time. Recent studies by the Educause AppliedCentre for Research (Smith, Salaway & Borreson Caruso, 2010) andthe Pew Internet & American Life Project (Lenhart, Purcell, Smith &Zickuhr, 2010) have indicated that Facebook is currently the mostpopular social networking system in higher education and that several students have begun using this application to supportvirtual study groups.

The study group application on Facebook allows students to postmessages, conduct discussions, and exchange files. The advantageof using these group areas is that students can support each other,academically and socially, outside of class time. The downside ofusing Facebook is that this application is designed to promote socialinteraction rather than to create a learning space.

13. Online Discussion Board

As mentioned, online discussion forums can be a powerful catalyst to promote individual reflection and criticaldialogue outside class time. Institutional learning management systems (LMS) such as Blackboard often supportthese discussions. These institutional applications often presentcollaborative challenges as it can be difficult to have external guestsparticipate in the discussions (e.g., have to get the administrator to enrol guests in the LMS) and to provide students with moderator(e.g., instructor) status.

Creating a course group space using social networking tools such as Facebook and LinkedIn can help overcome these issues.

The membership of groups on Facebook can be open or controlledby the moderator (e.g., course instructor). Anyone who hasa Facebook account can be invited to become a member and participatein the online discussions. This could include past studentmembers of the course (e.g., alums), external experts, and even parents.Any member of the group can moderate the group discussionforums. When a posting is made to the discussion, the person’sFacebook profile image also appears, helping to create a more immediatesense of community.

14. Pre-Class Activities

Teachers and students can use social content tools to create, post, and share digital learning objects before class. Forexample, teachers can use podcasts (e.g., PodOmatic), narrated MSPowerPoint presentations (e.g., SlideShare, Adobe Presenter) orvideo (e.g., YouTube) to communicate course concepts, scenarios,and case studies with students before class time. The advantagesof using these learning objects are that they allow studentsto listen and view course-related material outside of class time, attheir own pace, and as often as required to gain understanding.

15. Social Content

Social content tools allow creating and exchanginguser-generated content (e.g., text, audio, images, and video). Applicationssuch as YouTube, Flikr, SlideShare, and PodOmatic provide many reusable media resources for learners and educators. Theseresources can support pre-class activities, course learningobjects, individual presentations, and group workshops.

16. Learning Objects

Students can also use social content applications to create learning objects to describe and explain threshold course concepts. For example, individuals or groups of students can be assigned to create images, short podcasts, or YouTube video clips about key terms, definitions, or concepts related to the course. These resources can then be posted to the course website or linked to a learning object repository such as the Multimedia Educational Resource for Learning and Online Teaching (merlot) site (http://www.merlot. org/merlot/index.htm). The learning objects linked to Merlot are categorised by discipline, and many of these objects have also been peer-reviewed by user communities with suggestions on how to use these digital resources in course assignments.

17. Individual Presentations and Group Workshops

Individual presentations and group workshops are often essential to a blended learning course. Unfortunately, these activities often focus on information dissemination (e.g., lecturing) rather than on discussion, and they can also consume a tremendous amount of precious class time. To avoid these issues, several instructors have begun to require students to use various social content tools to create narrated versions of their individual or group presentations.

These narrated presentations can then be posted or linked to an online discussion forum where other students must view and comment on them before a class or synchronous session (e.g., narrated PowerPoint presentations and YouTube videos).

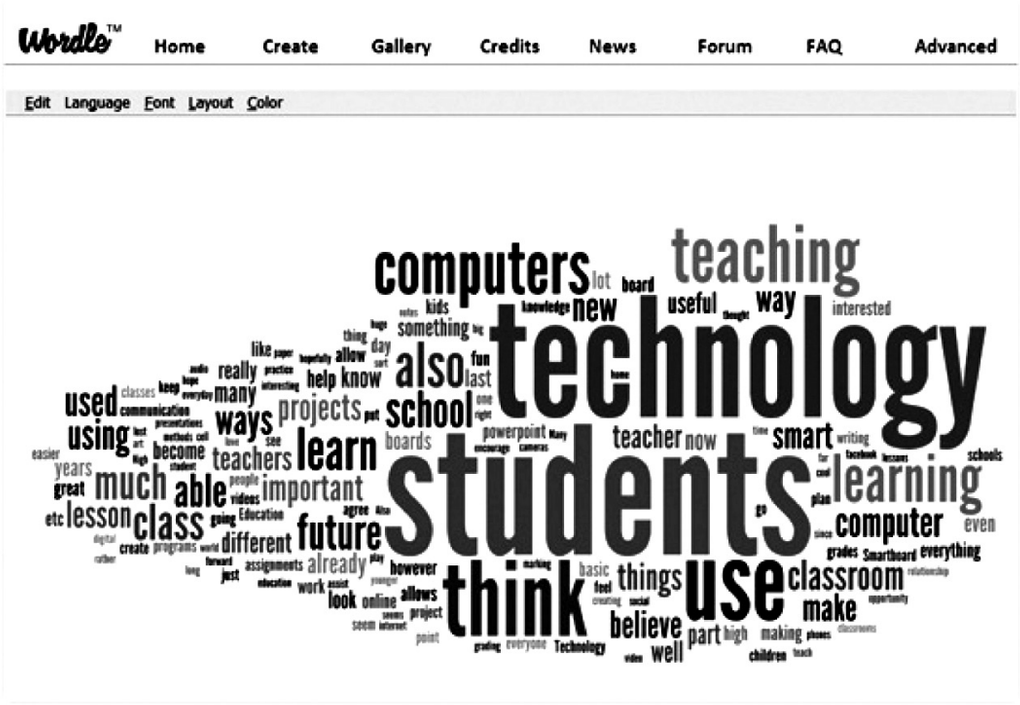
Class time is then used to discuss and debate the questions and issues raised in the discussion forum about the presentations.

18. Mashups

Mashup tools allow nontechnical users to mix or "mash" different data types to discover new meanings or present information in an unconventional format. For example, music mashups combine tracks from two or more source songs. Mashup applications can be used for mapping and data visualisation activities, student projects and research work presentations, class and online discussion analysis, and digital storytelling.

19. Analysis of Class and Online Discussions

As mentioned, many higher-education students are now bringing laptops and mobile devices into the classroom. Wiki applications such as TitanPad can be used to take collaborative class notes. These notes can then be copied and pasted into a mashup application such as Wordle to create "word clouds", as shown below:



Word clouds can be beneficial for helping students identify keythemes related to course concepts and issues. For example, at thebeginning of a class, an instructor can ask the students to brainstormwhat they already know about a course concept in GoogleDocs. The instructor copies and pastes this text into Wordle to create a Word cloud. Higher-frequency

words and phrases are displayedin a different colour and larger font size. The instructor canthen facilitate a discussion about these keywords and phrases andexplain how they relate to a particular course concept.This activity can also be repeated at the end of a class period orcourse module to demonstrate changes in students' conceptual understanding. The instructor displays the word clouds createdat the beginning and end of a class period and then asks students tocompare and contrast the keywords in an online discussion forum after class. Conversely, an instructor can create wordclouds from the discussion forum postings on a particular topic andthen display these for further debate in a classroom session.

20. Digital Storytelling

A series of mashup applications have been developed for Mac (e.g., GarageBand, iMovie) and PC (e.g., Photo Story, Movie Maker) computers. These applications allow users to combine and mix images, text, music, and video to create a digital story.

Students can completethese stories individually or in groups and combine various formsof media, allowing for multiple pathways of creativity and success. Several websites have been developed to help studentscreate their own digital stories. We highly recommend theUniversity of Houston's Educational Uses of Digital Storytellingsite (http://digitalstorytelling.coe.uh.edu/) as it provides examples,tools, tutorials, and rubrics for assessing digital stories.

21. Synchronous Communication and Conferencing

Using synchronous communication tools (e.g., text messaging, audio, and video) is becoming common in higher education. Some instructors use these applications to replace classroom sessions (e.g., online blended learning approach), while students use these tools to support real-time collaborative project-based work. At many institutions, synchronous communication applications, such as Adobe Connect and Blackboard Collaborate, have been integrated into the learning management system. Instructors can use these tools to create learning resources (e.g.,record a mini-lecture, including diagrams and illustrations, inthe accompanying whiteboard), host external guest presentationsduring class time, and replace physical classroom sessions withvirtual ones. The focus of these sessions should not be on informationtransmission, such as lecturing, but instead, be used to diagnosestudent misconceptions, foster critical dialogue and support peerinstruction.

22. Virtual Worlds

Virtual world applications such as Second Life, Croquet, and The Palace allow synchronous interaction in 3-D immersive worlds.

These tools support collaborative and creative project-based work beyond text-based and audio communication. Many campus-based learning activities, such as lectures, tutorials, and labs, can be replicated and enhanced in a virtual world application. For example, students can participate in virtual role-plays, simulations, and experiments. They can visit educational "islands" for mentorship and advice from resident experts (e.g., NASA). Students can also visit foreign islands to learnabout different languages and cultures.

Students meeting in a Virtual classroom

Students meeting in a Virtual classroom

6.2.6: ISSUES AND CHALLENGES

Information and communication technology (ICT) has significantly impacted education but has challenges. Let us delve into some of the critical issues related to using ICT in education:

1. Lack of Accessibility: In underdeveloped nations and disadvantaged areas, the inaccessibility of ICT poses a severe challenge. Unequal student access to technology and the internet creates a digital divide, limiting their ability to pursue higher education.
2. High Initial Costs: Implementing ICT in educational institutions requires substantial investments in infrastructure, hardware, software, and maintenanceto adopt technology-driven instructional initiatives fully.
3. Technical Issues and Dependency: ICT is not immune to technical hiccups. Recurrent system failures, software defects, and network problems can disrupt the teaching and learning process.
4. Pedagogical Integration Challenges: Integrating ICT technologies into pedagogy requires careful planning and alignment with educational objectives. Many teachers find it challenging to incorporate technology seamlessly into their classroom activities. Balancing traditional teaching methods with cutting-edge ICT approaches can be difficult, resulting in inefficient integration and limited impact on learning outcomes.
5. Resistance to Change: Implementing ICT often faces resistance from educators. Some teachers may be reluctant to adopt new technology, fearing it will disrupt their existing teaching strategies or due to a lack of confidence in their technological skills. Overcoming this resistance is crucial for successful implementation.
6. Standardization and Interoperability: Interoperability and standardisation are essential for effective integration. Ensuring compatibility across hardware, software, and educational resources is necessary to maximise the benefits of ICT in education.

Educators, policymakers, and stakeholders must collaborate to address these challenges to create an inclusive, cost-effective, and technically robust ICT environment. By doing so, we can harness technology's full potential.

❖ **Challenges of using ICT in Education**

1. Lack of Accessibility

The inaccessibility of ICT in education is a severe drawback, especially in underdeveloped nations and disadvantaged places. The digital divide, which results from unequal student access to technology and the Internet, limits their ability to pursue higher education.

2. High Initial Costs

Implementing ICT in educational institutions necessitates extensive infrastructure, hardware, software, and maintenance expenses. Due to these high initial expenses, schools and districts with tight budgets may find it challenging to adopt technology-driven instructional initiatives fully.

3. Technical Issues and Dependency

ICT is not exempt from technical hiccups and problems. Recurrent system failures, software defects, and network problems might impede teaching and learning. Furthermore, when systems fail, over-reliance on technology can result in serious setbacks that frustrate teachers and children.

4. Pedagogical Integration Challenges

When integrating ICT technologies into pedagogy, careful planning and connection with educational objectives are required.Many teachers find it challenging to integrate technology into their classroom activities effortlessly. Balancing traditional teaching methods with cutting-edge ICT approaches can be difficult, resulting in inefficient integration and little impact on learning outcomes.

5. Resistance to Change

Implementing ICT in education often encounters resistance to change. Some instructors may be reluctant to implement new technology because they worry about upsetting their teaching strategies or lack trust in their technological know-how.Implementation success depends on overcoming opposition and promoting a positive outlook toward ICT integration.

6. Standardization and Interoperability

Interoperability and standardisation are essential for seamlessly integrating ICT tools across many platforms and systems. ICT in education can be ineffective if hardware, software, and educational resources are incompatible. Promoting interoperability and establishing shared standards is crucial to fully utilising ICT.

7. Evaluation and Assessment

Identifying how ICT affects learning outcomes and its effectiveness can be challenging. Conventional assessment techniques might not sufficiently capture the advantages of ICT integration.To analyse the influence of ICT effectively, it is crucial to create evaluation frameworks and assessment techniques that reflect the evolving character of education.

8. **Technological Obsolescence**

   The rapid pace of technological development causes technology obsolescence. To stay current with technological advancements, educational institutions must continuously invest in modernising their ICT infrastructure and resources.

9. **Inadequate Training and Skills**

   Teachers require extensive training and assistance to use ICT tools effectively. Regrettably, many educators lack the abilities and understanding to use technology effectively. This knowledge gap may restrict the potential benefits of ICT integration into the curriculum.

10. **Inequality in Digital Literacy Skills**

    Not all students have equal access to technology or are proficient in digital literacy. The digital divide causes differences in students' skills in using ICT technologies effectively inside and between educational institutions. The lack of digital literacy among students may harm their academic progress and constrict their chances in the future.

6.2.8: LET US SUM UP

Bichronous online learning is the blending of both asynchronous and synchronous online learning. During the asynchronous parts of the course, learners can participate anytime, anywhere, but they must then participate in real-time activities for the synchronous sessions. The amount of the online learning blend varies by course and the activities included in the course.

Design is a planning process considering many content and process issues related to the intended learning outcomes. The planning process described here is shaped at the conceptual level by assumptions, principles, and purposes. Design begins before course commencement with a holistic perspective describing the assumptions and approaches to learning. This provides a framework for principles and guidelines that shape the design process of choosing content, creating student learning activities of collaboration and interaction, and identifying assessment procedures.

Social networking systems (SNS) such as Facebook and LinkedIn can be used to extend the boundaries of the classroom to create online communities and discussions and debates that include past students, potential employers, and subject matter experts. Audio, graphic,

and video files can now be created and shared through social content applications such as PodOmatic, Flikr, and YouTube.

The inaccessibility of ICT in education is a severe drawback, especially in underdeveloped nations and disadvantaged places. The digital divide, which results from unequal student access to technology and the Internet, limits their ability to pursue higher education.Implementing ICT in educational institutions necessitates extensive infrastructure, hardware, software, and maintenance expenses. Due to these high initial expenses, schools and districts with tight budgets may find it challenging to adopt technology-driven instructional initiatives fully.

Information and communication technology (ICT) in education has many advantages, but it is also essential to understand its drawbacks. To ensure a balanced and successful integration of ICT in education, it is crucial to address the issues of accessibility, costs, technical difficulties, distractions, inadequate training, privacy concerns, limited social interaction, inequality, screen time, inaccurate information, health concerns, and dependence on technology.

6.2.9: ASSIGNMENT

5. Define the concept of online learning.
6. Define the Bichronous modes of teaching and learning.
7. Differentiate between synchronous, asynchronous and bichronous modes of online teaching.
8. Elucidate the need for professional development of teachers to use ICT.
9. Describe the different ways of using ICT in Education.
10. Note down the challenges of online teaching and learning.

6.2.10: SUGGESTED READINGS

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ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK-7

Task Analysis

Unit-1

Meaning, nature and steps of Task Analysis

CONTENT STRUCTURE

7.1.1: Introduction

In ET we often discuss it as Input-Process-Output components. In input component we have to consider the entry behaviour of the learners. After considering the entry behaviours we design and implement the instructional strategies. In this context, it is very crucial to know the concepts of Task Analysis and Instructional objectives.

7.1.2: Objectives

After completing the block the learner will be able to:

- Explain the meaning of Task analysis
- Discuss the nature and steps of Task analysis
- State the meaning of different domains of behaviours
- Describe the taxonomy of each domain of behaviours
- Apply action verbs to formulate instructional objectives

7.1.3: Meaning of Task Analysis

Task analysis is a systematic process used to break down a complex task or activity into smaller, more manageable components. The type of analysis helps to understand the steps, actions, and cognitive processes involved in a task by identifying the knowledge, skills, and resources required to complete the task successfully. Task analysis is used in various fields such as education, psychology, human factors engineering, and instructional design.

These is another concept related to Task analysis, that is Cognitive Task analysis (CTA). Cognitive Task Analysis is the extension of traditional task analysis techniquesto yield information about the knowledge, thought processes and goal structuresthat underlie observable task performance. This analysis technique is used to understand the cognitive processes and knowledge structures underlying the performance of complex tasks. Unlike traditional task analysis, which focuses primarily on observable behaviours and actions, Cognitive Task analysis delves into the mental activities, decision-making strategies, problem-solving techniques, and domain-specific expertise that individuals employ when performing tasks.

7.1.4: nature of Task Analysis

Some of the essential characteristics of task analysis are given below:

Dividing task into smaller subtasks: It dissects a task into smaller units, steps, or subtasks. This allows us for a detailed examination of the actions, decisions, and cognitive processes involved in task performance.

Systematic Approach: Task analysis involves a structured and systematic approach to break down a complex task or activity into manageable components.

Contextual Understanding: Task analysis always considers the contextual perspectives in which tasks are performed, like- environmental factors, organizational issues, and user characteristics.

Cognitive perspective: Task analysis considers not only the observable behaviours or actions required to perform a task but also the underlying cognitive processes, decision-making strategies involved.

7.1.5: Stages of Task Analysis

The following are steps to conduct a Task analysis:

Step-1: Identify the Task: The first step is to identify and define the task properly that to be analyzed. This could be a job task, a learning activity, a user interaction with a product, or any other type of task.

Step-2: Gather required information: The next step is to collect information about the task. This helps to gain a comprehensive understanding of the task and its context.

Step-3: Breaking down the task: Now the task is to be analysed into its constituent parts, or subtasks. This involves identifying the elements and the interrelation among the elements. And finally identify the steps and their sequencing.

Step-4: Sequencing the steps: Arrange the steps of the task in a logical sequence, considering dependencies and prerequisites.

Step-5: Identify the outcome: Determine the possible outcomes that result from implementing.

Step-6: Validate the Analysis: Validate the task analysis by subject matter experts, or end users to ensure its accuracy and completeness. Incorporate feedback and revisions as necessary to refine the analysis.

Step-7: Review: Review and refine based on ongoing feedback given by stakeholders.

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BLOCK- 7
Task Analysis

Unit-2
Formulating instructional objectives of behaviours

7.2.1: Formulating instructional objectives in different domain of behaviours

7.2.1.1: Instructional objectives- Meaning and nature

Instructional objective is a statement that will describe what the learner will be able to do after completing the instruction. Instructional objective must be realistic, measurable, and learner centric.

Suppose a teacher will discuss a chapter 'Learning- meaning, nature…'. Here the instructional objectives may be as follows:

After completing today's lesson, the learner will be able to:

- Define learning
- Discuss the nature of learning
- …….

In the above instructional objectives, the verbs 'define', 'discuss' are all called as Action verb, which means that learners have to do something after completion of the lesson. There are different action verbs. Here are some of them are given below:

appraise, break down, categorize, change, combine,compare, compile, compose, compute, conclude, contrast,convert, create, defend, define, demonstrate, describe,design, draw diagram, differentiate, discover, discriminate,distinguish, estimate, extend, example, explain, generalize,

generate, give identify, illustrate, infer, interpret, justify,label, list, manipulate, match, modify, outline, operate,organize, paraphrase, plan, point out, predict, prepare,produce, rearrange, reconstruct, relate, reorganize,reproduce, revise, rewrite, select, separate, show, solve,state, subdivide, summarise, tell, use, write,(Source: Measurement and Assessment in Teaching- Linn &

Gronlund -8thedition)

7.2.1.2: Domains of Behaviour

Now we discuss the concept of instructional objectives considering different domains of behaviours. Human behaviour can be categorized into various domains. If we consider the psychological perspectives, then t human behaviours can be classified into main three categories. These are as follows:

Cognitive Domain: This domain pertains to our different cognitive processes such as perception, memory, reasoning, problem-solving, decision-making etc. It encompasses how individuals acquire, process, store, retrieve information and apply in real world.

Affective Domain: The affective domain involves emotions, attitudes, values, and beliefs.

Psychomotor Domain: This domain relates to physical movement, coordination, and skills.

7.2.1.3: Instructional Objectives of Cognitive domain

Taxonomy of Cognitive Instructional domain was first developed by Benjamin Bloom. Later Anderson and associates revised the taxonomy and we discuss this revised taxonomy in this module. The hierarchy of cognitive domain instructional objectives are given below from lower to higher ability level, that means the first level is easy and the last level is the most difficult.

Remembering: This level involves recalling or retrieving factual information, concepts, or procedures from memory. Examples of behaviours at this level include recalling facts, definitions, or procedures and recognizing or identifying information.

Understanding: This level involves making sense of information by interpreting and summarizing information. Behaviours at this level include interpreting, summarizing, paraphrasing, and explaining ideas or concepts.

Applying: It refers to using or applying the acquired knowledge, skills, or strategies in new or real contexts. Behaviours at this level include applying, using, implementing, or executing knowledge or skills in different situations.

Analyzing: It involves breaking down information into its component parts, and identifying the patterns or relationships among the parts. This level involves comparing, contrasting, categorizing, and organizing information.

Evaluating: It means making judgments or assessments based on some criteria or standards. This level involves judging, justifying, evaluating, criticizing, defending opinions etc

Creating: It is the highest level of cognitive domain taxonomy. This level involves synthesis and creativity and involves designing, constructing, planning, or producing original work.

7.2.1.4: Instructional objectives of Psychomotor domain

There are different experts who worked in this domain, like- Dave, Simpson, Harrow etc. Here we will discuss the Dave's taxonomy. Dave's taxonomy consists of five hierarchical levels of psychomotor learning:

Imitation: At this lowest level, learners are able to observe and replicate the basic physical movements demonstrated by others. Imitation involves mimicking actions without necessarily understanding the underlying principles or reasons behind the behaviour.

Manipulation: At this stage, learners develop the ability to perform physical tasks with some degree of precision and coordination. This level involves performing the skill in a recognizable fashion by following instructionrather than observation.

Precision: Precision refers to perform a task or skill independently with accuracy, proportion and exactness, that means at an expert level. Learners at this level are able to demonstrate mastery of the skill.

Articulation: Articulation involves the modification of the skill to execute complex tasks or actions and to fit new situations.

Naturalization: This is the highest level of psychomotor learning, characterized by the automatic and effortless execution of skills. Learners at this level can perform them instinctively and adaptively in real-world situations without conscious effort.

7.2.1.5: Instructional objectives of Affective domain

The taxonomy of the affective domain proposed by David Krathwohl, Benjamin Bloom, and their colleagues. This taxonomy consists of five hierarchical levels of affective learning:

Receiving: At this lowest level, learners passively receive or attend to stimuli, information,

or experiences. Receiving involves being open to sensory input and paying attention to stimuli without necessarily responding or reacting to them.

Responding: Responding involves actively participating or engaging with stimuli, information, or experiences in a meaningful way. This level involves behaviours like following instructions, or participating in activities, demonstrating a willingness to engage with the learning process etc.

Valuing: Valuing involves comprehending and appreciating the worth of ideas, beliefs, or principles. At this level, learners develop personal preferences, beliefs, and attitudes based on their experiences.

Organization: This level entails structuring and prioritizing values, beliefs, attitudes, or principles into a structured and integrated system. Learners at this level reconcile conflicting values, prioritize goals, and develop a sense of personal identity and purpose, demonstrating a fixed set of values and principles that guide their behaviour.

Characterization: It involves internalizing values, beliefs, attitudes, or principles to the extent that they become deeply fixed and guide behaviour consistently across different contexts. Learners at this highest level demonstrate a consistent pattern of behaviour.

7.2.2: Let us Sum up

In this module we have discussed the meaning, nature and steps of Task Analysis. Task analysis is an activity to break down a complex task into its constituent parts and then sequencing the task for better outcome. Later we have discussed the meaning and three domains of instructional objectives, namely Cognitive, Psychomotor, and Affective domain. Three domains classification of instructional objectives are discussed in this module.

7.2.3: Assignment

1. What is task analysis? Describe the steps for Task analysis.
2. What is Instructional objectives. Consider a topic and write down at least ten instructional objectives using action verbs.
3. Discuss the instructional objectives cognitive domain after considering a unit from Science?
4. Describe the hierarchy of Psychomotor domain of Psycho-motor development.
5. State the meaning of taxonomy of Affective domain.

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BLOCK- 8
Trends in ET

Unit-1
High-Access, Technology-rich Learning Environment, Online and Blended learning

CONTENT STRUCTURE

8.1.1: Introduction

Recent trends in educational technology reflect advancements with a focus on enhancing accessibility, engagement, and effectiveness in teaching and learning. Recent issues in educational technology encompass a wide range of challenges and concerns that impact the use of digital tools and resources in education. Some notable trends in ET are- Personalized Learning, Artificial Intelligence (AI) and Machine Learning, Online and Blended Learning Models, Microlearning, Augmented and Virtual Reality, Social and Collaborative Learning Platforms, Digital Citizenship and Online Safety Education, Screen Time and Digital Distraction etc.

8.1.2: Objectives

After completing the module the learner will be able to:

- Explain the meaning high-access and technology-rich learning environment
- Discuss the meaning and nature of Online and Blended learning
- State the meaning of hypermedia and multimedia and their relationship
- Describe the stages of TIP and discuss the advantages of TIP

8.1.3: High-Access and Technology-rich Learning Environment

In this concept two basis ideas are there. One is 'High-Access' and another is 'Technology-rich' learning environment. We discuss the two concepts separately:

High-Access: Here High-Access refers to the high-access technology. "High-access technology" means such a context or environment where learners have extensive and convenient access to digital devices, internet connectivity, and technology-enabled resources to support teaching and learning. For this type of high-access technology, initiatives should be taken for providing students with personal digital devices (e.g., laptops, tablets) for learning purposes, ensuring strong internet connectivity and Wi-Fi infrastructure within the educational institutions, and arranging digital resources and online platforms readily available to students and educators.

Technology-rich: Technology-rich learning environment refers to an educational setting where digital tools, digital resources, and technology-enabled learning experiences are integrated

into teaching-learning process. In a technology-rich learning environment, technology helps for innovation, collaboration, and personalized learning opportunities. There are three major characteristics of technology-rich learning environment- Internal connectivity (within the faculty), external connectivity (access external database), and adaptability (to use and modify)

High-Access Technology-rich learning environment:

Considering the two concepts separately, a high-access and technology-rich learning environment refers to an educational setting where learners get widespread access to digital devices, resources, and technology-enabled learning tools to support their learning and academic growth. This type of environment is the result of the integration of technology into various aspects of teaching and learning. It promotes digital literacy, collaboration, and personalized learning experiences. Some key features of this type of learning environment:

Device Initiatives:

This ensures equitable access to technology and enables students to engage in digital learning activities both in and out of the classroom.

Robust Digital Infrastructure: A robust digital infrastructure, including high-speed internet connectivity, Wi-Fi accessibility, for integration of technology into teaching and learning.

Digital Resources: Students have access to a different digital resource (digital textbook, multimedia material etc.), and online platforms to give opportunities to students to engage with content in interactive and multimedia-rich formats.

Computer Managed Learning Systems (CMLS): It serves as centralized platforms for delivering online courses, organizing course materials, facilitating communication and collaboration, and managing assessments and assignments.

Adaptive Learning Technologies: These technologies provide adaptive methodologies, assessments, and personalized feedback system to optimize student learning outcomes.

If we want to implement this type of high-access technology-rich learning environment, the following steps may be taken:

- Assessment of the current state of digital facilities.
- Establish clear goals and objectives for digital learning.
- Invest for necessity infrastructure and technology resources to support a technology-rich learning environment.
- Select appropriate digital tools and resources.

- Promote equitable access to all learners.
- Evaluate the effectiveness of technology used and try to refine strategies for technology integration.

8.1.4: Online and Blended learning

Online learning (sometimes referred as e-learning or virtual learning): It refers to a mode of education that takes place remotely through internet or digital platforms. In online learning, instruction, course materials, and interactions between students and instructors occur online rather than in a physical classroom setting. It allows students to access educational resources and participate in learning activities from anywhere.

International Society for Technology in Education (ISTE) defines online learning as

"Online learning is the delivery of educational content via the internet. It can take many forms, from traditional courses that include multimedia components to entirely virtual courses, or MOOCs (massive open online courses), which are offered for free to large groups of learners."

Blended learning (sometimes referred to as hybrid learning): It is an educational approach that combines physical instruction with online learning activities. In blended learning mode, students engage in a mix of face to face sessions and online learning experiences, with the goal of integrating the best aspects of both modes of instruction. Some definitions of Blended learning are given below:

Graham (2006): Blended learning systems combine face-to-face instruction with computer-mediated instruction

Garrison and Kanuka (2004): The thoughtful integration of classroom face-to-face learning experiences with online learning experiences

Allen and Seaman (2010): Course that blends online and face-to-face delivery. Substantial proportion of the content is delivered online, typically uses online discussions, and typically has a reduced number of face-to-face meetings.

Model of Blended learning: Michael B. Horn and Heather Stacker's book '*Blended:Using Disruptive Innovation to Improve Schools'* provides four blended learning models:

Rotation Model: Here students rotate between different learning modalities, including face-to-face instruction, online learning, and independent study.

Flex Model: It allows for personalized and self-paced learning, with students having control over the time, place, path, and pace of their learning.

Enriched Virtual Model: This model combines online learning with occasional face-to-face meetings or workshops for collaborative projects, group discussions, and hands-on activities.

À La Carte Model: In this model, students may take online courses to fulfill specific academic requirements, pursue advanced coursework, or explore areas of interest not available in their regular curriculum.

Trends of online and Blended learning: Trends in online and blended learning continue to change and evolve due to rapid technological changes. Here we mention some of recent trends in online and blended learning:

- Increasing demand especially after the COVID-19 pandemic.
- Blended learning models, which combine traditional face-to-face instruction with online learning components, are becoming more prevalent.
- Personalized learning pathways is gaining attention in online and blended learning environments, with a focus on catering individual student needs, interests, and learning styles.
- Microlearning, which involves delivering content in short and focused (like- short videos, quizzes, and interactive activities) is becoming very popular in online and blended learning environments.
- Virtual and augmented reality technologies are being integrated into online and blended learning experiences to create immersive and interactive learning environments.

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ADVANCED EDUCATIONAL TECHNOLOGY

BLOCK- 8
Trends in ET

Unit-2
Hypermedia, Multimedia and (TIP) model for teachers

8.2.1: Hypermedia and Multimedia

Multimedia: Multimedia originated from the combination of 'multi'-means many, and 'media' means various forms of communication. Multimedia refers to the integration of different types of media, such as text, images, audio, video, animations, and interactive elements, within a single digital presentation or communication. Multimedia content can be delivered through various digital platforms and formats, including websites, presentations, digital publications, educational materials, entertainment media, and interactive applications. Examples of multimedia are- web page, slide show that incorporates text, images, audio narration, and embedded videos, educational software program.

Hypermedia: The term "hypermedia" originated from the combination of "hypertext" and "multimedia." Hypertext refers to the text that contains hyperlinks, which are interactive elements that allow users to navigate to other sections of the text or to different documents or resources. And multimedia refers to the integration of different types of media, such as text, images, audio, video, animations, and interactive elements. After considering the meaning of hypertext and multimedia, hypermedia refers to digital content that incorporates hyperlinks or interactive elements, allowing users to navigate through interconnected information in a non-linear fashion. Unlike traditional linear media, such as printed text or broadcast television, hypermedia enables users to access additional information, related resources, or alternative pathways based on their interests and preferences.

Trends in hypermedia and multimedia:

Here are some important trends in hypermedia and multimedia are discussed below:

- There is a growing trend towards interactive storytelling experiences that combine multimedia elements with branching narratives.
- Augmented and virtual reality technologies are increasingly being integrated into multimedia experiences to create immersive and interactive environments.
- User-generated multimedia content, such as videos, podcasts, and social media posts, continues to grow in popularity. Platforms, such as YouTube, TikTok, and Instagram, are driving this trend.
- Multimedia experiences are increasingly focusing on engaging multiple senses to create immersive and impactful experiences, like the use of haptic feedback, 3D visuals, and other sensory cues to enhance the overall user experience and evoke emotional responses.
- Cross-platform compatibility ensures that users can access and interact with multimedia content across their preferred devices and channels.

8.2.2: Technology Integration planning (TIP) model for teachers

At first, we discuss the meaning of Technology integration. Some of the definitions of technology planning are given below:

- Technology integration means teaching a subject which exists in the curriculum via technology as an instructional tool (Misirli, 2016).
- Technology integration is the application of technology to facilitate learning through different mediums....” (Yemothy, 2012).
- Davies & West (2013) defines technology integration “as the effective implementation of educational technology to accomplish intended learning outcomes”.

Thus, technology integration is nothing but the use of technologies or medias in the teaching-learning process

Some examples of technology integration are:

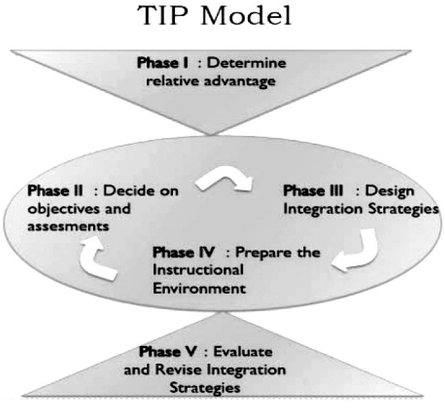
- A teacher uses ‘computer’ to show an ‘online video programme’ during the teaching-learning process.
- When presentation software like, PowerPoint is shown to present a topic, then technology is being utilized.
- Similarly, a teacher uses ‘mobile phone’ to video record an incident to teach any concept is also an application of technology.

- If the teacher directs the students to search 'internet' and explore the latest information about the topic being taught, technology is part of the teaching-learning process.

Advantages of technology integration in teaching-learning process:

- enhances student's autonomy and individualized learning practices
- helps students to actively engage in learning
- students get opportunity to learn beyond classroom hours
- access to quality learning resources
- benefit students with special needs.
- enhances student's quality of work.
- prepare students for future jobs by developing ICT skills.
- supplements teacher's instruction.
- helps to plan and mange activities of educational institution.

Technology Integration Planning (TIP) model:



- **Phase-I: Determining relative advantage:**In the first phase, the teacher focuses on questions such as- Why should I think of integrating a technology? How technology will offer better solutions to my teaching problems? In what way integrating technology is an advantage in relation to other teaching styles? In short, first phase addresses two questions; the issues and relative advantage of teaching with technology.
- **Phase-II: Decide on objectives and assessments:**The second phase is related to the learning objectives and related assessment techniques. Thus, second phase describes objectives of technology integrated teaching and its assessment.
- **Phase-III: Design integration strategies:** This phase focuses on instructional design, such as objectives of teaching, topic going to be transacted, etc. which helps teacher to develop appropriate technology integrated instructional design.
- **Phase-IV: Prepare the instructional environment:**This phase helps teacher to check essential facilities to conduct technology integrated teaching.
- **Phase-V: Evaluate and revise integration strategies:**The phase provides insights to teachers for reflection and developing strategies for improvement. After implementing

the technology integrated teaching, teacher reflects on the teaching session and identifies the shortcomings and problems of technology integration.

8.2.3: Let us Sum up

ET is a dynamic field. ET evolves rapidly with the advancement of new technology. In this module we have discussed the concept of 'High-access technology-rich learning environment' as a recent trend in ET. Later we have explained the meaning of online and blended learning along with the trends. Then the trends in Hypermedia and Multimedia have been discussed. At last we have discussed TIP (Technology Integration Planning) model for teachers.

8.2.4: Assignment

1. What is meant by High-Access Technology-rich learning environment?
2. How do you start a high access technology-rich learning environment?
3. Explain different models of Blended learning.
4. State the meaning of Hypermedia and Multimedia? Discuss the trends of hyper and multi media.
5. Describe TIP model for teachers with suitable illustration.

8.2.5: Suggested Readings

1. Roblyer, M.D. Integrating Educational Technology into Teaching 2006. Pearson Education Inc. Chapter 2 pages 52-62
2. Rooney, J. E. (2003). Blending learning opportunities to enhance educational programming and meetings. (5), 2632.
3. Singh, H. (2003). Building Effective Blended Learning Programs. Retrieved July 20,2015 from asianvu.com/digitallibrary/elearning.
4. Bonk C.J., & Graham, C.R. (2006). The handbook of blended learning environments: Global perspectives, local designs.
5. Dangwal Kiran L.: (2004) Computers in Teaching and Learning:Shre Vinod PustakManir, Agra.

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