মানুষের জ্ঞান ও ভাবকে বইয়ের মধ্যে সঞ্চিত করিবার যে একটা প্রচুর সুবিধা আছে, সে কথা কেহই অস্বীকার করিতে পারে না। কিন্তু সেই সুবিধার দ্বারা মনের স্বাভাবিক শক্তিকে একেবারে আচ্ছন্ন করিয়া ফেলিলে বুদ্ধিকে বাবু করিয়া তোলা হয়।

— রবীন্দ্রনাথ ঠাকুর

Any system of education which ignores Indian conditions, requirements, history and sociology is too unscientific to commend itself to any rational support.

— Subhas Chandra Bose

ভারতের একটা mission আছে, একটা গৌরবময় ভবিষ্যৎ আছে, সেই ভবিষ্যৎ ভারতের উত্তরাধিকারী আমরাই। নূতন ভারতের মুক্তির ইতিহাস আমরাই রচনা করছি এবং করব। এই বিশ্বাস আছে বলেই আমরা সব দুঃখ কষ্ট সহ্য করতে পারি, অন্ধকারময় বর্তমানকে অগ্রাহ্য করতে পারি, বাস্তবের নিষ্ঠুর সত্যগুলি আদর্শের কঠিন আঘাতে ধূলিসাৎ করতে পারি।

— সুভাষচন্দ্র বসু

Price : Rs. **400.00**

Not for sale to the students of *NSOU*

Published by : Netaji Subhas Open University, DD-26, Sector-1, Salt Lake City, Kolkata-700 064 and
Printed at : Royal Hlaftone Co., 209/C, Bidhan Saranee, Kolkata-700 006

CBCS • UG • HED • EDUCATION • CC-ED-09

NETAJI SUBHAS OPEN UNIVERSITY

Choice Based Credit System (CBCS)

SELF LEARNING MATERIAL

HED

EDUCATION

Educational Technology

CC-ED-09

Under Graduate Degree Programme

PREFACE

In a bid to standardise higher education in the country, the University Grants Commission (UGC) has introduced Choice Based Credit System (CBCS) based on five types of courses viz. *core, discipline specific, generic elective, ability* and *skill enhancement* for graduate students of all programmes at Honours level. This brings in the semester pattern, which finds efficacy in sync with credit system, credit transfer, comprehensive continuous assessments and a graded pattern of evaluation. The objective is to offer learners ample flexibility to choose from a wide gamut of courses, as also to provide them lateral mobility between various educational institutions in the country where they can carry acquired credits. I am happy to note that the University has been accredited by NAAC with grade 'A'.

UGC (Open and Distance Learning Programmes and Online Learning Programmes) Regulations, 2020 have mandated compliance with CBCS for U.G. programmes for all the HEIs in this mode. Welcoming this paradigm shift in higher education, Netaji Subhas Open University (NSOU) has resolved to adopt CBCS from the academic session 2021-22 at the Under Graduate Degree Programme level. The present syllabus, framed in the spirit of syllabi recommended by UGC, lays due stress on all aspects envisaged in the curricular framework of the apex body on higher education. It will be imparted to learners over the *six* semesters of the Programme.

Self Learning Materials (SLMs) are the mainstay of Student Support Services (SSS) of an Open University. From a logistic point of view, NSOU has embarked upon CBCS presently with SLMs in English / Bengali. Eventually, the English version SLMs will be translated into Bengali too, for the benefit of learners. As always, all of our teaching faculties contributed in this process. In addition to this we have also requisitioned the services of best academics in each domain in preparation of the new SLMs. I am sure they will be of commendable academic support. We look forward to proactive feedback from all stakeholders who will participate in the teaching-learning based on these study materials. It has been a very challenging task well executed, and I congratulate all concerned in the preparation of these SLMs.

I wish the venture a grand success.

Professor (Dr.) Subha Sankar Sarkar

Vice-Chancellor

Netaji Subhas Open University

Undergraduate Degree Programme

Choice Based Credit System (CBCS)

Subject : Honours in Education (HED)

Course : Educational Technology

Course Code : CC - ED - 09

First Print : August, 2022

Printed in accordance with the regulations of the
Distance Education Bureau of the University Grants Commission.

Netaji Subhas Open University

Undergraduate Degree Programme
Choice Based Credit System (CBCS)
Subject : Honours in Education (HED)
Course : Educational Technology
Course Code : CC - ED - 09

: Board of Studies :
Members

: Course Writer :

Mr. Santu Biswas
SACT-I
Department of Education
Dwijendralal College, Krisnanagar

: Course Editor :

Dr. Parimal Sarkar
Assistant Professor, SoE,
NSOU

: Format Editor :
Dr. Papiya Upadhyay
NSOU

Notification

Kishore Sengupta
Registrar

Netaji Subhas Open University

UG : Education
(HED)

Course : Educational Technology
Course Code : CC - ED - 09

Module-I
Educational Technology & Communication

Module-II
Technology Adoption in Education

Module-I

Educational Technology & Communication

Unit-1 ❑ Technology and Education

Structure

1.1 Objectives

After the completion of the Unit, learners will be able to:

- Know the Concept and Scope of Technology and Educational Technology.
- Understand the meaning and differences between Technology of Education Vs. Technology in Education.
- Discuss the Concept of Hardware and Software approach in Educational Technology.
- Explain the Significance of Hardware and Software approach in Educational Technology.

1.2 Introduction

Modern age is the age of science and technology. The world of today is very dynamic and we are the witnesses of series of technological innovations in our day

to day life. The life of man in the primitive age was altogether different from his life in this sputnik age. There have been tremendous changes in the life style of human beings which may be attributed to the contribution of science and technology. Its influence is being reflected in all productive endeavors.

This unit introduces you to some basic concepts of Technology and Educational Technology which include the Meaning, Nature and Scope of Technology and Educational Technology. With recent development and advancement of technology its application in education is increasing day by day and opens a new area for educators, teachers and students. Technology is being successfully utilised in resolving many problems of education. Hence, it has become common to extend its successful application to the teaching-learning situation. The most distinctive feature of modern society is science based technology. Also discuss the difference between Technology of Education and Technology in Education. This unit introduces you the basic components of educational technology: Hardware and Software on the basis of concept and significance of component of educational technology.

There has been a great explosion of knowledge during the last few decades and the main task of education in modern society is to keep pace with this advance in knowledge which is not possible without the help of technology. Educational technology is application of technology in the field of education.

1.3 Concept and scopes of Technology and Educational Technology

1.3.1 Concept & Scopes of Technology :

Concept :

Technology is the outcome of accumulated knowledge and application in all techniques, skills, methods, and procedures utilised in industrial production and scientific study that is always evolving. For the intended aim of an organisation, technology is incorporated in the operation of all machines, with or without through understanding of their function. Systems are the building blocks of society's technologies. By collecting an input, adjusting this input for the system's intended purpose through a process, and then creating an outcome that changes the system's final intended purpose, systems apply the intended application of a technology's acquired knowledge. A technology system or technological system is another name for this.

The earliest and simplest form of technology is the development of knowledge that leads to the application of basic tools towards an intended purpose. The prehistoric invention of shaped stone tools and the discovery of how to control fire and increased the sources of food that were available to human beings through the proper cooking procedures that eliminated almost all disease-causing pathogens in food sources. The event that occurred after, the Neolithic Revolution, extended the importance of this event and quadrupled the sustenance available from a usable territory through the development of farming technologies.

Technology or Technological Science is a synonym of an English word 'Technology'. Technology means—Methods of using scientific knowledge in daily life. According to Prof. Golbraith, There are two major characteristics of Technology—

(1) Systematic application of scientific or other organized knowledge to practical tasks.

(2) Forming the division and sub-division of any such task into its component parts.

So, it can be said that the scientific mechanisms and experimental techniques as well as technical or technological sciences. 'Technical' term of 'machine' or machine-related suffixes people usually associate with. But it is not necessary that the 'technical' should only be used in a machine or machinery.

This means that any experimental work, in which scientific knowledge or principles should be used. It derives from the Greek word 'Technikos' which means—art. This is the synonym of the Latin language word 'Texere' which means for weaving or construction.

First, technology is defined as consisting of both hardware and Software (the knowledge required to produce and use technological hardware). Second, the essential feature of technology – its dynamic nature – is outlined.

Finally we can say that, technology is the application of scientific knowledge to the practical aims of human life or, as it is sometimes phrased, to the change and manipulation of the human environment.

DEFINITIONS :

MacKenzie and Wajcman (1985) define *"techmology as the integration of the physical objects or artifacts, the process of making the objects and the meaning associated with the physical objects".*

Jacquetta Bloomer (1973) define "*Technology is the application of scientific theory to practical ends".*

According to Dr. Das *"Any system of interrelated parts which are organized in a scientific manner as to attain some desired objective could be called technology."*

Burgelman et al. (1996) refer *technology as the theoretical and practical knowledge, skills, and artifacts that can be used to develop products and services as well as their production and delivery systems.*

According to Kumar et. al (1999) technology consists of two primary components: *1) a physical component which comprises of items such as products, tooling, equipments, blueprints, techniques, and processes; and 2) the informational component which consists of know-how in management, marketing, production, quality control, reliability, skilled labor and functional areas.*

Ann Marie Hill (1997) has defined *technology concepts as framed by three areas of study: physical products, human processes and environmental systems which include concepts such as: structures, materials, fabrication, mechanisms, power and energy, control, systems, functions, aesthetics and ergonomics.*

SCOPE OF TECHNOLOGY :

Technology is the product of transferring scientific knowledge to practical use. Different forms of technology are the result of people trying to find more efficient ways to do things and testing new ideas.

Technological scope refers to a firm's technology configuration. One extreme, to develop as many technological projects as possible, is referred to as technological diversification. The other extreme is to develop as far as possible a limited number of projects, which is referred to as technological specialization. Some scope of technology is mention below :

Information Technology :

We have moved from an industrial age to the information technology age. Now, the organisations use information technology to create, store and process data to achieve the desired outputs. So, there are a plethora of services and software programs to simplify cumbersome processes. Hence, you can utilise Information technology to deliver information through hardware, software and attached services.

Communication Technology :

Communication technology is another variant of information technology. It supports data movement and improves customer retention. So, simple data can be converted into valuable insights with the help of information technology tools. Team members can improve internal communication. Customers can provide feedback and help in improving products & services.

Management Technology :

Managers utilise management technology to take well informed and better decisions. In addition to it, easy retrieval and exchange of data allows efficient management of business and clients. So, technologically advanced and proper database systems help reduce costs. Not only this, these improve performance and increase overall profitability.

Artificial Intelligence :

Artificial Intelligence is a step ahead of simple technology. The creation of intelligent and smart machines that work like humans. That's sounds so strange but interesting! High-tech research and programming techniques are required to build such intelligent machines. These AI enabled systems are instrumental in solving a variety of technical and other issues.

Medical Technology :

Medical technology is the usage of science to develop equipment and solutions to improve quality of life by helping with common health issues or for defeating hard and deadly diseases. From eye-glasses and bandages to MRI scanners, medical technology is squarely aimed at reducing the health-hassle in life.

Industrial and Manufacturing Technology :

Technology in industrial fields provides a faster and cheaper alternative to older methods. Modern machinery like automated forges, conveyer belt lines, large scale ovens, CNC mills etc. are forms of industrial technology. These machines help to reduce manufacturing times- this is because of the immense amount of processing these can do at a time and the ability to run constantly- increasing the productivity of factory plants.

Education Technology :

Education technology defines the equipment and methods that help students learn. The list of equipment ranges from simple calculators to the next-gen augmented reality e-learning tech. The core idea of education technology is to facilitate better leaning. And this act of facilitation can happen in different levels.

Agriculture Technology :

Agriculture technology is defined as the use of technology in agriculture. Precision equipment, robots, drones, GPS, tractors are all agricultural tech. The intent of these equipment is to increase production and lower cost. By using GPS and similar tech,

the best place for plantations can be found. Then the use of robots allows farmers to be precise with means they can target patches of the field and not waste fertilizers and other materials.

Electronics Technology :

Electronic technology is the use of science in order to design, manufacture, install, test, maintain and control electronic parts. Devices like phones and computers are based on electronic technology. Such technologies are used in business applications and residential applications. Electronics technology is a part of the fabric of our lives. The use of this tech exists in every corner of life now.

Robotics Technology :

Robotics technology is the process of designing and building intelligent robots. The robots incepted from robotics technologies are in most cases intended to replace or diminish human intervention. One particularly well-known use of robotics is in mass manufacturing car companies. There, robots do the jobs that would take a long time for humans like welding and painting. Robotics' application in a corporate mindset is to reduce production time of each individual product unit.

Assistive Technology :

Assistive technology is the equipment used for assisting people with disabilities. This includes any device or equipment that might help a person with disabilities. Assistive technology comes in many forms. Wheelchairs and 'text-to-speech' functions in devices are all examples of assistive technology.

Different disabilities deem different assistive tech. A person who has a tough time hearing can use a speech to text converter to converse.

Similarly, a student with a disorder like dyslexia might use of the many available software to help him study. Assistive tech is aimed at making life better for the special ones in society.

1.3.2 Concept & Scope of Educational Technology

Meaning and Concept :

Education is a comprehensive discipline that is responsible for influencing individual behaviour through appropriate teaching and learning methods, strategies, and procedures. Significant developments have been noted in this regard since the period of raditional Guru Sisya parampra. The complex process of teaching and learning has been transformed and simplified in this current era of science and

technology by the use of educational technology, which is nothing more than the application of modern technology in the field of education.

The term 'technology' implies the application of science to art. The concept of technology has developed during the last few years. It is a new area in the discipline of education. Educational technology is comprised of two words education and technology. When we apply the science of learning and communication to teaching we evolve a technology. There are three major factors that emphasize the linking of education with technology.

1. Educational Technology is concerned with the development, application, and evaluation of system,techniques and aids to improve the process of human learning. It could be conceived as a science of techniques, methods and media by which educational goals could be realized. "Educational Technology"
2. May be defined as the systematic application of the knowledge of sciences to practical tasks in Education.
3. It is a communication process resulting from the adaptation of the scientific method to the behavioral science of teaching/learning. Educational technology is seen both as a means as well as service to effect and facilitate better and more productive learning systems. It may be defined as a separate field in the theory of education dealing with the development and application of the use of educational resources.

Definitions of Educational Technology :

According to G.O.M. Leith *"Educational technology is the systematic application of scientific knowledge about teaching-learning conditions of learning to improve the efficiency of teaching and training."*

Shiv K. Mitra define *"Educational technology can be conceived as a science of techniques and methods by which educational goals could be realized (Mitra, 1968:4)."*

According to S.S. Kulkarni *"Educational technology may be defined as the application of the laws as well as recent discoveries of science and technology to the process of education."*

According D. Unwin *"Educational technology is concerned with the application of modern skills and techniques to requirements of education and training. This includes the facilitation of learning by manipulation of media and methods, and the control of environment in so far as this reflects on learning."*

W. Kenneth Richmond define *"Educational technology is concerned with providing appropriately designed learning situations which, holding in view the objectives of teaching or training, bring to bear the best means of instruction."*

According to I.K. Davies *"Educational technology is concerned with the problems of education and training context and it is characterized by the disciplined and systematic approach to the organization of resources for learning."*

J.R. Gases define *"Educational technology has to be seen as part of a persistent and complex endeavor of bringing pupils, teachers and technical means together in an effective way".*

Scottish Council for Educational Technology: *"Educational technology is systematic approach to designing and evaluating learning and teaching methods and methodologies and to the application and exploitation of media and the current knowledge of communication techniques in education, both formal and informal".*

John P. Dececco define *"Educational Technology is the form of detailed application of psychology of learning to practical teaching problems"*

According to E.E. Hadden *"Educational Technology is that branch of educational theory and practice concerned primarily with the design and use of messages which control the learning process."*

SCOPE OF EDUCATIONAL TECHNOLOGY:

Educational technology is concerned with all variables, phases, levels, and aspects of the teaching learning process. In brief, it works for overall planning and organization of the system or subsystem of education. The areas of its operation in education system is summarized below ;

Analyse the Teaching Learning (T. L.) Process :

Educational technology tries to discuss the concept of teaching, analysis of the teaching process, variables of the teaching, phase of teaching, levels of teaching, theories of teaching, principles and maxims of teaching, the concept of learning, relevance of the theories, the relationship between teaching and learning.

Identify the Educational Goals or Objectives :

Educational technology tries to discuss the topics such as identification of education needs and aspirations of the community, survey of the resources available for satisfaction of these needs.

Development of Curriculum :

Educational technology is concerned with the designing of a suitable curriculum for the achievement of the educational objectives.

Development of Teaching-Learning Material :

Educational technology is concerned with the production and development of the suitable teaching learning material in view of stipulated objectives, design curriculum and available resources.

Teaching Preparation or Teaching-Training :

Teacher is a key figure in any process of teaching and learning. Educational technology, therefore tries for the proper preparations of teachers for exercising their complex responsibilities.

Development and Selection of Teaching-Learning Strategies :

This aspect deals with the central problems of teaching learning act. Here educational technology tries to describe the ways and discovering, selecting and developing suitable strategies and tactic of teaching.

Development, Selection and Use of Appropriate Audio-Visual Aids :

Teaching-learning is greatly influenced and benefited by the use of appropriate audio-visual aids.

Educational technology covers this aspect by discussing various types of audio-visual aids used for educational purpose, their proper selecting suiting to a particular teaching-learning situation.

Effective Utilization of Hardware and Mass Media :

Various sophisticated instrument, equipment, gadget and communication devices brought through mechanization and electronics revolution playing an effective role in the attainment of educational objectives by helping the teachers and learners in their respective roles.

Work for the Effective Utilization of Subsystem of Education :

Educational technology considers education as a system operating, in a systematic and scientific way, for the achievement of educational objectives.

Provide Essential Feedback and Control Through Evaluation :

Educational technology essentially concerned with the task of exercising

appropriate control over the process of teaching and learning by planning and devising suitable tools and devices for the continuous evaluation of the process and products of the teaching-learning activities.

■ **Advantages of Educational Technology :**

Technology is one of the most valuable tools that we have available at our fingertips every day. The contribution of technology in education also uncountable one.The major advantages of educational technology are listed below;

Individualized Instruction :

Educational Technology is very helpful in individualizing instruction by enabling us to make use of selfinstructional programmes.

Improvement in the Quality of Teaching :

Educational Technology –learning process by enabling us to use more varied, rich and motivational programmes through T.V. and other media.

Encourages Development of New Teaching Methods :

Rather than spend an hour or so talking while the students listen, or have them read an entire chapter in silence, teachers and professors now have the option to use advanced teaching methods, such as podcasts, blogs and social media. When working with a particular group or one-on-one, teachers can take advantage of web conferencing technologies other online communication tools.

Meeting the Problem of Mass Education :

Educational technology helps in using programmes developed by experts for a large population of students with the use of computer and T.V etc.

Equalizing Educational Opportunity :

Educational Technology assist us in making efforts for equalizing educational opportunity. Irrespective of economic, social and geographical status of the learners.

Prepares Students for the Future :

From the way technological advancements are going, it is obvious that the future will be digital and technology-focused. If students are well-versed on using technology to collaborate and communicate as early as now, they will not have trouble fitting in, competing and finding jobs in the future. Being familiar with using at least one form of technology at an early age will help them become comfortable using it, and

eventually develop other skills necessary to handle other innovative devices and processes.

Lowering Textbook and Tuition Prices :

With resources more accessible and in great abundance, the cost of textbooks is likely to decrease. It is also possible that students may no longer need to buy a textbook, if it is converted into digital format. The actual books can stay in the classroom, while the content is saved on a student's computer.

1.4 Techonology of Education Vs. Technology in Education

Many people are perplexed by the terms "technology of education" and "technology in education." Education has come a long way since its inception, albeit it now involves much more than what was previously taught, and technology has made learning easier for both teachers and students. Technology has reached schools and classrooms to improve the way education is taught and absorbed by pupils. It is not confined to gadgets and appliances used by people in their daily lives. People frequently get confused by two sentences in this context because they sound similar but are not.

A. Technology of Education

Technology of education is also referred to as educational technology and is in reality incorporation of IT into the realm of classroom. This is a constantly evolving field that depends upon technological advancements. The use of technology in education has many advantages just as technology has enriched the world in all walks of life. One can see and feel the change in air as classrooms are becoming modern and teachers and students are benefiting with gadgets such as smart boards and computers.

The advent of the internet has made a sea of change in the way teachers can demonstrate concepts and ideas to children and make learning almost fun. Information today has been encapsulated in the internet which can be beautifully used to allow learning be a fun rather than being a drudgery which it used to be in earlier times. What this has meant is that education is no longer limited to the privileged few, and even those who are downtrodden and poor can learn all the ideas and concepts which were like a dream to them in earlier times. Internet today has become very commonplace and its true potential can be realized by disseminating knowledge through it to all, without any discrimination.

Technology in Education :

Technology in education is a subject of study in and of itself for people associated with developing technological tools for educational reasons. It is not restricted to sing technology to make learning and imparting education easier in any way. Technologists are constantly designing tools and devices for use in classrooms, keeping in mind the ultimate users, which are students and teachers. These are the people who are driving this change and are working nonstop in the field of educational technology to cover all learning and instruction processes.

Technology in education refers to but is not limited to the use of hardware and software, including internet and other related activities, for the purpose of increasing human capabilities. The use of technology in education is always welcome as it enables both teachers and students to gain knowledge in a much better and faster rate. Nevertheless, ultimately it is teachers who make use of all the technology and hence, they will remain as important as ever, and technology can never even think of replacing teachers.

Difference Between Technology of Education and Technology in Education :

There is the basic difference between Technology of Education and Technology in Education, which is given below :

- Technology of education is the incorporation of IT into the realm of classroom.
- Technology in education is not limited to making use of technology to make learning and imparting of education easier in all possible ways but also a field of study in itself for those who are involved with developing technological tools for educational purposes. It is a much broader area that technology of education.
- The technology of education, also referred to as EduTech, encourages the use of technology to enhance the process of learning of the current school curriculum. On the other hand, technology in education (TechEd) focuses on learning how technology works.
- Technology of education deals with systematic application of the resources of scientific knowledge of the processes of learning that each individual has to pass through in order to acquire and use knowledge.
- Technology in education refers to the use of technological hardware in education. Technology in education is not limited to making use of technology to make learning and imparting of education easier in all possible ways but

also a field of study in itself for those who are involved with developing technological tools for educational purposes. It is a much broader area that technology of education.

- Technology of education" refers to the learning strategies, instructional strategies, pedagogies, etc. which aim at achieving a teaching-learning goal.
- "Technology in Education" refers to the external technologies such as Computers, Internet, Content Authoring tools, simulations, animations, manipulable objects, etc.

1.5 Basic Components of Educational Technology (Hardware and Software) Concepts and Significance

1.5.1 Concept :

The educational technology composed of mainly two components such as hardware and software. Both hardware and software is equally important for effective application of educational technology. For example an interactive computer programme is worthless without suitable educational programme. Both hardware and software are complementary to each other.

Hardware Approach :

Hardware in education refers to electronic gadgets that are based on scientific principles and procedures.

It is founded on the concept of service and has its roots in Physical Sciences and Applied Engineering.

It follows a product-oriented strategy. It deals with the creation and use of audio-visual aids (such as charts, models, slides, filmstrips, audio cassettes, and so on), sophisticated instruments and gadgets (such as radio, television, films, projectors, tape recorders, video players, teaching machines, computers, and so on), and mass media. For its operation, Hardware Technology makes use of Software Technology's goods (such as teaching methodologies, instructional learning material, and so on). Hardware technology has the ability to make educational benefits more accessible and affordable to the general public. Too much use of technical gadgets may mechanize the process of teaching-learning as the Hardware approach tries to enter education from outside, operating more in isolation than in combination.

The hardware approach refers to the use of machines and other mechanical devices in the process of education. Its origin lies in the application of "physical science" to education and training system. The process of teaching-learning has been gradually mechanized through the use of teaching machines, radio, television, tape recorder, video-tape, projectors etc. The teacher can deal with a larger group of students at the same time by his discourse through these machines. The hardware approach is based on the application of engineering principles for developing electro-mechanical equipment for instructional purposes. Motion pictures, tape recorders, television, teaching machines, computers are called educational hardware.

Hardware approach mechanises the process of teaching so that teachers would be able to deal with more students with less expenditures in educating them.

Human knowledge has three aspects :

❖ Preservation, ❖ Transmission and ❖ Development.

- The history of preservation of the knowledge is believed to exist since the printing machines started. The knowledge is preserved with these machines in the form of books which are shelved in the libraries, tape recorders and films.
- The second aspect of human knowledge is its transmission. A teacher can impart knowledge himself to his pupils. Now a days, transmission of the knowledge is supported by machine like mike, radio and television. With these, thousands of pupils can enjoy this home-delivery of such benefits.
- The third aspect of human knowledge is its development. For this aspect, provisions are made for research work. In the research programmes, the main function is the collection and analysis of data. For this purpose, presently the researcher uses the electronic machines and computers.

Hence, all the three aspects of knowledge allow the use of machines. In short, the teaching process has been mechanized. The mechanization of teaching process is termed as the Hardware Approach.

Basis of Hardware Approach :

- ❖ Hardware Approach has physical science and applied engineering as its basis.
- ❖ Hardware Approach has mechanised the whole teaching-learning process.
- ❖ Hardware Approach adopts a Product-oriented Approach.
- ❖ Hardware Approach has the potential to hand over the educational benefits to the mass with greater ease and economy.

Characteristics of Hardware Approach :

1. Silverman, called this type of educational technology 'Relative Technology'. Based on physical science and applied engineering field approach. The concept of hardware approach is derived from the application of "physical science" to education.
2. The new mechanism of teaching-learning with improved technology as its basis. Suggesting innumerable new ways of doing things to the class-room teachers.
3. The job and the duties of the teacher are likely to have multifaceted changes as they are to deal with many new gadgets for teaching and learning.
4. Engineering principles are used for the development of these types of technical equipment's. The teacher can deal with larger group of students with the help of these 'Mechanical device' or 'Machines'.
5. The teacher can deal with larger group of students with the help of these 'Mechanical device' or 'Machines' , resulting in less cost and economy in finances.

Software :

To solve educational difficulties, software refers to a systematic, scientific application of appropriate scientific research from physical science, social science such as psychology and sociology, philosophy, management studies, and other fields. Teaching technology, instructional technology, and behaviour technology are all terms used to describe it. It has its roots in behavioural sciences and applied parts of learning psychology. It's a method based on processes. It makes use of understanding of learning psychology to create learning materials, teaching – learning tactics, and other (Software Technology) for the improvement of the teaching-learning process. It does not provide users with direct services. Rather, it aids in the creation of numerous software resources that are employed in the development of hardware appliances. It contains instructional strategies, learning materials,, evaluation tools, teaching models, programmed instruction, etc. Software technology does not require any aid form the hardware technology for its delivery. It becomes more useful and productive when assisted by the Hardware Technology. Software technology does not have mass appeal and is costlier in the long run, as compared to hardware technology.

- The pioneering work in software approach was done by Skinner and other behaviourists. The programmes which such a technology produces are often

called software. Software Approach is also termed as Instructional Technology or Teaching Technology or Behavioural Technology.

- It originates from behavioural sciences and their applied aspects concerning psychology of learning. The software approach used the principles of psychology for building in the learners a complex repertory of knowledge or modifying his behaviour. Psychology of learning provides solid technology for bringing desirable behavioural changes in the pupils and serves the cause of education of laying down definite instructional procedure, teaching behaviour and behaviour modification devices.
- Newspapers, books, magazines, educational games, flash cards may also form part of software. Software approach is characterised by task analysis, writing precise objectives, selection of appropriate learning strategies, immediate reinforcement of responses and constant evaluation.
- Software approach refers to the application of teaching- learning principles to the direct & deliberate shaping of behavior. Its origin lies in the application of "behavior science" to the problems of learning & motivation.
- Educational technology is closely associated with the modern principles & theories of teaching. Models of teaching, theory of instruction, theory of teacher-behavior & principles of programmed learning. It is characterized by task analysis, writing, objectives in behavioral terms, selection of the appropriate teaching strategies, reinforcement for correct responses & continuous evaluation.
- Software Approach is concerned with teaching objectives in behavioural terms, principles of teaching, methods of teaching, reinforcement of instructional system, feedback, reviews and evaluation. Software approach tries to develop all the three basic components of technology, i.e. Input, Process and Output.

Basis of Software Approach :

A. In software approach, the basis of all thinking and working is behavioural science and psychology of learning.
B. Software approach uses the principles of psychology for the purpose of behaviour modification.
C. A teacher with added knowledge of software approach can use the films, flashcards, tapes etc., for various purposes.
D. A teacher can plan better teaching which results into better learning. There is not end to his thinking.

Characteristics of Software Approach :

1. This view of educational technology is closely associated with the modern principles of programmed learning and is characterized by task analysis, writing precise objectives, selection of appropriate learning strategies, reinforcement of correct responses and constant education.
2. Silverman termed this educational technology as 'constructive educational technology.' Also known as 'Management Technology'.
3. A modern approach in educational administration and organization. It has brought to educational management a scientific approach for solving educational administrative problems.
4. Origin of software approach lies in the application of 'behavioral science' to the education. It refers to the application of teaching- learning principles in the shaping of behaviour.
5. Its application while writing objectives in behavioral terms, selection of appropriate teaching, strategies, reinforcement for correct response etc

DIFFERENCE BETWEEN HARDWARE AND SOFTWARE APPROACH

Hardware Technology	Software Technology
1. Has its origin in physical sciences and applied engineering.	1. Has its origin in behavioural sciences and their applied aspects concerning psychology of learning
2. More concerned with the production and utilization of audio visual aid material and sophisticated instruments and mass media for helping teacher and learners in their task.	2. Try to make use of psychology of learning for the production and utilization of software techniques and materials in terms of learning material, teaching-learning strategies and other devices for smoothening the task of teaching learning.
3. Tries to adopt product-oriented approach, in the shape of teaching-learning material and strategy through the in utilization of the hardware instruments and gadgets for effective teaching learning.	3. Tries to adopt a process-oriented technique or approach for the production of teaching-learning material and strategies. The material produced here is made available for being used by the hardware application.

Hardware Technology	Software Technology
4. Based on the concept of service meaning hereby that it provides services in the field of education.	4. It helps in the production of software material being used by the hardware applications and gadgets for delivering their service to the users i.e. teachers and learners.
5. As examples of the appliances and gadgets being used in hardware technology service we can name radio, television, tape recorder, video, slides and film projectors, teaching machines and computer etc.	5. As examples of the material produced through software technology we can name, programmed learning material, in the shape of charts, pictures, models, slides filmstrips, audio and video cassettes, software packages etc.
6. Has its mass appeal and utilization. It can contribute a lot in handing over the educational benefits to masses with greater case and economy.	6. Has no such wide application and appeal to masses as found in the case of hardware appliances like radio, telephone, computer application, etc.
7. Has resulted in improving the efficiency of educational, means and reducing the cost of education. A teacher may handle a big class with the help of hardware appliances like microphone, slide and film projectors etc.	7. Works for increasing the efficiency of the teachers as well as learning. However, it lags behind in the task of improving efficiency and reducing the cost of education.

1.5.2 Significance of Hardware and Software Approach :

A. Making the task of teaching-learning interest, purposeful and productive :

- Suggesting suitable teaching-learning methods, devices and strategies based on psychology of teaching-learning.
- Suggesting suitable maxims and principle of teaching-learning based on the theory and practice of technology of teaching-learning.
- Putting various types of audio-visual aid and materials and equipment at the disposal of teachers and learners.

- Providing a variety of instructional and self-learning material suiting the varying needs of teaching-learning situations and individuality of the teacher and learners.

B. Use the multimedia and multi-sensory approach to teaching-learning :

Hardware and software technologies help the teacher as well as the learners for making a proper and judicious use of multimedia and multi-sensory aid material, equipment and principles of teachinglearning, derived from psychology and technology of teaching.

- All the sensory organs sense the sight, hearing, touch, smell and taste for the acquisition of the desired teaching-learning experiences.
- Multimedia, material and appliance involving hardware and software technologies for sharing desirable teaching-learning technologies.
- All the relevant and needed teaching-learning method, devices, and strategies, well-accompanied and aided by hardware and software technologies.

C. Management of the affairs of educational practices in an efficient and productive way :

Educational and professional responsibilities,-

1. Planning o teaching-learning.
2. Organization of teaching-learning.
3. Leading teaching-learning.
4. Controlling teaching-learning.

D. Providing proper input and process for the best possible outcomes (products) :

In the true spirit of the system engineering, use of hardware and software technologies can help the educational and instruction system to make all possible efforts for providing adequate and the needed process organizations to arrive at the best possible outcomes.

E. Fulfilling the expectation of distances and correspondence education :

The demands of today's education and modern education practices are putting increase emphasis on the extension of distance education and correspondence and online education facilities to the increasing number of learners.

F. Individualization of instruction :

Individualization of instruction is a major trend in the modern educational practices and is the demand of the hour. In brief, we can highlight the role of hardware and

software technologies on this account by stating some of the materials and equipment as follows :

1. Programmed instruction, programmed books, and programmed learning modules.
2. Teaching machines, computer assisted instruction and computer managed learning.
3. Video and audio recorded learning and instructional material.
4. Email, internet, teleconferencing and other online educational facilities.
5. Special aid material, equipment and appliances used for special education and adjustment measure of for the disabled.
6. Special provisions and facilities for the creative and gifted to nature and develop their individual capacities according to their pace and interest.

1.6 Summary

In this unit you have learnt about the concept, nature and scope of technology and educational technology and its significance. You have also got an idea about hardware and software components of educational technology and there educational significance. To make educational universalize in our country it is really needed that educational technology should grow properly with its quality. This unit has also distinguished technology of education and technology in education.

1.7 Self-Assessment Questions

1. What do you mean by Technology?
2. Define Educational Technology.
3. Discuss the scope of Educational Technology.
4. What is the difference between technology of education and technology in education?
5. What is the meaning of Hardware Technology?
6. What is the meaning of Software Technology?
7. Describe the significance of Hardware Technology on Education.
8. Describe the significance of Software Technology on Education.

1.8 Reference

Aggarwal, J. C. (2009). Essentials of Educational Technology. New Delhi: Vikas Publishing House.

Kochhar, S. K. (1985). Methods and Techniques of Teaching. New Delhi: Sterling Publishers.

Mangal, S. K.(2001). Foundation of Educational Technology. Ludhiana: Tendon Publication.

Mayer, R. E. (2005). Cambridge handbook of multimedia learning. New York, NY: Cambridge University Press.

Mangal, S.K. & Mangal, U.(2016),. Essentials of Educational Technology, PHI publication, Delhi

Mohanty, J,.(2008) Educational Technology, Deep and Deep Publications PVT. LTD, New Delhi

Sampath, K., A. Panneerselvam, S. Santhanam. (2007). Introduction to Educational Technology. New Delhi: Sterling Publishers.

Shankala, D.P. (2006). Educational Technology. New Delhi: Adhyayan Publishers and Distributors.

Sharma, K. K. (2007). Educational Technology. Delhi: Mahaveer & Sons Publishers and Distributors.

Sharma, R. A. (2002). Technology of Teaching. Meerut: International Publishing House.

Unit-2 ❑ Systems Approach in Education

Structure

2.1 Objectives

After completion of the Unit, learners will be able to:

- Know the Concept of System Approach in Education
- Discuss the Scope of System Approach and its implication on Education.
- Understand the various component of System Approach in Education and their interrelationship.
- Explain the Problems of implementing Systems Approach in Education.

2.2 Introduction

System approach is a systematic attempt to coordinate all aspects of a problem towards specific objectives. The characteristics of a system of may be explained with the help of an example – various parts of the system may be called as components of system approach. Every component of the system contributes to as supports in functioning of the system as a whole. In the context of education, system is a unit as a whole incorporating all its aspects and parts, namely, pupils, teachers, curriculum, content and evaluation of instructional objectives. The teaching-learning process is

viewed as communication and control taking place between the components of a system. In this case, the system is composed of a teacher, a student and a programme of instruction, all in a particular pattern of interaction.
In this unit we have to discuss concept and scope of system approach in education. And also discuss the various components of System approach in education. The last phase of this unit highlight the various problem for implementing system approach in education.

2.3 Systems Approach in Education, Concept and Scope

The system approach involved in of setting objectives and goals, analyzing resources, creating a plan and make regular evaluation and modification of the program. The system approach views the educational program as a system of interrelated parts. It is a plan of learning pattern with all parts such as the school, the teacher, the students the objective the media the materials and assessment tools and procedures that are integrated as a whole. This approach integrates the older, more familiar methods and tools to enhance teaching-learning process with news ones such as the computers. The system approach has been introduced in Guyana in the field of education to enhance the teaching-learning process in the classrooms.

Concept of System:

The term 'system' denotes organization, as in the organization of the systemic whole. Each portion is obviously connected to the other, and the total is formed. "System is an ordered complex totality (an assemblage or combination of items or elements) constituting together a complex unitary whole," writes Johnson (1963). The etymological definition of the term "system" is "a collection of things controlled and operated by a continuous interaction or mutually dependent processes." A system is a large process that incorporates several concepts in a logical order. "A system is an object that is tied to some activity and produces a form of integration and unity in that activity," according to Allport (1955). Discussing its characteristic, that it is a methodology and whole, which is a systematic arrangement of different elements, and in which these elements are interrelated and interdependent. Basically it is a systematic arrangement of elements working in a specific manner.

2.3.1 Concept of System Approach:

Because of the shift in technology focus from the classroom to curriculum preparation, the instructional process has grown extremely complicated. As a result of the instructional programme, the number of objectives to be met has expanded. The

amount of material to be taught, as well as the media to be used, has exploded. The number of students and teachers involved in the overall educational system has risen dramatically. In such a case, comprehensive and precise planning is critical. The curriculum should not only provide ways for assisting students in teaching the objectives and evaluation instruments to measure their progress, but it should also suggest strategies for assisting students in teaching the objectives. This is called systems approach, an operational planning concept, borrowed from the engineering sciences and cybernetics, which deals with self-regulating and self-sustaining systems. In the recent years it has been introduced in the field of education as a strategy to manage, control and improve the process and products of education.

The modern approach is the system approach, connects with the hardware and software approaches. It has given a scientific approach to tackling educational administrative difficulties to educational management. Teaching is a complex process that necessitates meticulous planning in order to meet predetermined goals. The systems approach, which is concerned with methodical planning, designing, construction, and assessment of the education system, and it is used to streamline the teaching-learning process. The system method is used to create, implement, and evaluate educational systems, subsystems, and curricula, as well as individual lessons. If hardware is a computer system's body, software is its brain. Software refers to computer programs, procedures and documentation that perform certain tasks on a computer system.

Definition of System Approach :

According to Twelkier – *"Systems approach is a management tool that allows individuals to examine all aspects of the organization, to interrelate the effects of one set of decisions to another and to optimally use all the resources at hand to solve the problem".*

According to Khanna et al. (1998) reported that *"The systems approach involves the accurate identification of the requirements and problems, the setting of objectives after identifying their needs in performance oriented terms, the application of logic and analysis techniques to the problems, the development of methods for the solution of the problems and the rigorous measurement of the product against specific performance objectives. "In systems approach, education is a rational problem-solving process and it is also called the approach for getting systematic knowledge about the teaching-learning process".*

According to Jalauddin (1977), *"a system may be defined as a dynamic, complex, integrated whole consisting of self-regulating pattern of inter-dependent elements organized to achieve the pre-determined or specified objectives. The systems approach to instruction signifies a process and a technique by means of which an instructional system is developed, implemented, controlled and evaluated or improved".*

In the words of Kumar (2009) *"Systems approach is a term used to describe the systematic application of educational technology to an educational or training problem, starting with the input (entering behavior) and output (terminal behavior) how best to progress from the former to the latter."*

According to Kumar (2000), *"the systems approach to training provides valuable and rational means to plan training design and refine the training or learning situation leading to accomplishment of effective behaviour and modification of the learner".*

Chaudhary (1997) defined the systems approach as *"a systematic way of designing, evaluating the total process of teaching-training in terms of specific objectives, structuring the subject matter to bring out more effective instructions."*

2.3.2 Scope of System Approach :

The learner is prioritised in the System Approach, followed by course content, learning experiences, and successful media and instructional tactics. This type of technology has the capacity to provide constant self-correction and development. It is concerned with all aspects of learning, including media, hardware, and software. Its goal is to ensure that the components of the organic whole are available with the right features at the right moment to help the overall system achieve its goals. In the systems approach to instruction, the teacher has to plan completely the utilization of selected resource material and the classroom activities. The teacher should have a good overall view of the subject, know his/her limitations, know all about his/her pupils and the individual differences in their learning capacities and plan accordingly. The system approach involves continuous evaluation of learning outcomes and utilization of knowledge gained by analysis of results of evaluation to suitably modify the plan of approach to achieve the stated objectives. Major Scope of systems approach in education are:

Training psychology:

It is related to problems of training and making teaching and learning more effective so as to make behavior modification through feedback and reinforcement.

Systems analysis:

System analysis is more objective while making any system workable and worthwhile.

Formulate Principals:

Formulating general principles and laws for systems irrespective of their specific features, the nature of their constituent elements and relationship between them;

Formulating precise and rigorous laws:

Formulating precise and rigorous laws of a special type for non-physical fields of knowledge though the analysis of biological, social and the behavioural objects as system;

Cybernetic psychology:

Cybernetics, interdisciplinary science dealing with communication and control systems in living organisms, machines, and organizations. The term, derived from the Greek word kybernetes ("steersman" or "governor"), was first applied in 1948 to the theory of control mechanisms by the mathematician Norbert Wiener.

Synthesis of modern scientific knowledge:

Creating a basis for the synthesis of modern scientific knowledge by revealing the isomorphy of the laws pertaining to different spheres of reality.

STEPS IN SYSTEM APPROACH:

There are five major steps in organizing and developing a system. They are as follows:

A. System Analysis,

B. System Design and Development,

C. System Implementation / Operation ,

D. System feedback and

E. Improvement of the System.

A. System Analysis:

This step pertains to the task of analyzing a system in the form of identifying its elements, the organization of the elements, identifying functions of the elements i.e, making decisions of inputs, process, outputs and environmental constraints, and their appropriateness in view of structure and functioning of elements. Thus, the main activities in system analysis are as follows:

I. Identifications of the elements i.e, the 4M's –Men, Media, Materials and Machines.

II. Identify objectives of the system.

III. Identify function of each element individually and collectively.

IV. Organization of the elements function-wise.

V. Identify constraints that might interfere in the attainment of the objectives.

VI. Make a draft of action adjusting various elements to ensure the realization of the objectives.

B. System Design and Development:

The first task is concerned with analyzing and the second task relates to the task synthesizing what has been done in the first stage. Here attempts are made to design and develop the system on the basis of the analysis performed in Stage 1.The main activities in the step are

- Formulation and making decisions about the objectives of the system.
- Selection of the 4M's – i.e., appropriate devices, strategies, methods and approaches.
- Finalization of the parameters.
- Finalization of the comprehensive plan of action.
- Preparation of the final blueprint of the system.

C. System Implementation / Operation:

In the teaching-learning process is put into action in this step. The teacher-students roles and functions are executed in a systematic manner as planned. The different elements of the instructional system are integrated and synthesized keeping in mind the planned objectives.

D. Feedback/Evaluation of outcomes:

The outcome of the instructional process are to be evaluated in terms of the realization of the behavioral objectives and in terms of knowledge, understanding, application, skills, attitudes, aptitudes objectives, etc.

E. Improvement of the System:

Based on the analysis of results of evaluation, the plan of action is modifies to achieve to stated objectives. The efficiency of the system is assesses and suitable changes are made in the instructional materials, and teaching strategies in the light of evaluation.

Systems Approach as an Interdisciplinary Approach :

The systems approach is a team works in which specialists of different subjects (as science, engineering, mathematics, statistics, economics, politics, sociology, accountancy and behavioral sciences) work together. Discussing systems approach, Srivastav (1988) has said that in it, a system concept and thinking is applied. This is a type of ideology in which a problem is looked at, understood and analyzed as an integrated whole. In this approach, predetermined objectives are inherent in the components and sub-components for mutual interaction in organized mutual cooperation. In this approach, several sub-systems are interrelated such in a predetermined format or design that it can work as an integrated system, and thus go on to achieve the systems objectives effectively. When the systems achieve its predetermined objectives, only then it is called a successful systems approach; else it or its components and sub-components are suitably modified in order to amend and improve its format. On the basis of above analysis, it can be said in the words of Kulshreshtha (1998): Systems approach is a concept or educational tool which makes educational functions or challenges more successful, integrated, responsive, responsible, logical, systematic, automatic and flexible In it, the logical problem-solving method is used to analyze each aspect of the educational process, predetermined objectives are evaluated and then the analyzed elements (aspects) are synthesized in order to achieve integration.

Problem-solving is inherent in the systems approach. Generally the systems approach is a process in which needs and problems of a system are identified, then the problem is selected, and then the most suitable alternative for problem-solving is selected, the obtained solution and outcome are evaluated, and necessary amendments are effected, if necessary. The greatest characteristic of this system is that it does not analyze elements separately; rather it analyzes them on this integrated basis aimed at problem-solving. In this, the process synthesis is important together with the process of analysis. The systems approach carries an individual from the part to the whole. Discussing the systems approach, R.P. Bhatnagar (1996) has concluded that this is a logical problem-solving process which identifies and studies chief educational problems and its alternatives, and thus arrives at their solution. In other words, the systems approach is a tool which solves educational problems effectively and efficiently; this is an art of reflection which presents problem-solving in a scientific manner.

Education as a System:

Education, as a system, comprises of evaluation of students, teachers, curriculum, content and instructional objectives in the form of different elements. In the systems

approach of education, in the interaction of all these elements, the teaching-learning process is considered responsible for communication and control. In this context, the educational system is formed of teacher, student and instructional programme and a specific type of interaction pattern is developed.

Education always uses that latest ideology and technology which is helpful to enhance the quality of education. The systems approach is a technology which contributes in discovering most effective, cost efficient and intelligent methods. Finn (1960), Hoban (1962) and Heinrich (1970) have strongly advocated looking at education as systems approach.

Systems Approach in Education:

In the subject of education, the systems approach is becoming increasingly essential. Every nation's educational system serves to achieve its specific goals, and it is influenced by the suprasocial system. The society provides all of education's inputs, outputs, resources, and barriers. The social system is used to assess the educational system. Educational management, educational administration, educational counselling, and other sub-systems make up a system. These sub-systems work together as interdependent elements to achieve specific goals and activities. Interactions between all of these subsystems continue, and they all contribute to the supra educational system's overall aims.

2.4 Components of Systems Approach in Education and their Interrelationship

A systematic endeavour to coordinate all components of an issue toward certain objectives is known as a system approach. according to Webster's dictionary "A regularly interacting or autonomous set of components constituting a cohesive whole". The properties of a system can be discussed using an example: various sections of the digestive system can be referred to as digestive system components. Every component of the digestive system works together to keep the digestive system running smoothly. In the context of education, a system is a total unit that includes all of its elements and parts, such as students, teachers, curriculum, content, and assessment of instructional goals. The teaching-learning process is viewed as communication and control taking place between the components of a system. In this case, the system is composed of a teacher, a student and a programme of instruction, all in a particular pattern of interaction. The component of system approach function interconnected and interdependently.

Analyze:

The approach is an orderly process to help you work smarter and train better. The first phase of the process is analysis. In the analysis phase, look at the situation and the needs of the participants to determine what each specific training must include. The analysis can be exhaustive and include written surveys of all participants and thorough document reviews. On the other hand, it can be as simple as a few phone calls or informal questions asked of the likely participants.

The key benefit of a successful analysis phase is ensuring that every training session you offer meets the needs of the target audience. Additional benefits include:

- Ability to engage your audience and build investment prior to the training
- Increased attendance at trainings because the sessions are relevant to participants' needs
- Deeper trust between the training organization and participating organizations

Design:

The design phase involves building the skeleton of your training. In this phase you determine many elements, including:

- Educational objectives (determined, in part, by results from the analysis phase)
- Training title
- Training structure and outline
- Brief description of the training
- Method of delivery (in-person or virtual classroom)

Some aspects of the analysis and design phases of the system approach might already begin while the training plan is being created. There is significant overlap between the analysis and design phases and the steps needed to create the training plan. However, it's still important to be intentional when thinking through the design for each individual training. The benefits of a successful design phase include:

- Identification of the core learning objectives and purpose of the training
- Careful thought about the specific components of a training session prior to engaging in detailed development

Develop:

In the development phase, you take the skeleton created during the design phase and fill it in to create a valuable learning experience for participants. This involves developing the instructor lesson plan, participant handouts, and selected media, such as PowerPoint presentations, video, or audio.

At this point, it's important to think through the training session from the learner's perspective. Consider using small groups or interactive activities to increase knowledge retention. A good rule of thumb is to aim for 50% presentation and 50% participation. Presentation includes delivering new information. Participation is any interactive teaching method, such as role play, simulation, discussion, demonstration, or opportunity to practice. During the development phase, identify presentation methods and participant activities that are appropriate for the content.

All adults have previous learning and predetermined ideas – correct or incorrect – about any topic being presented. Participants will adopt and interpret new information based on their pre-existing mental frameworks. It's the facilitator's job to present the framework that he or she will use to provide new information in a way that clears people's minds and prepares them to learn. The facilitator also needs to bring everyone into the conversation, establish a shared vocabulary for purposes of the training session, and set and manage learner expectations.

The benefits of dedicating time to the development phase are:

- A well-planned training session that addresses adult learners appropriately
- Confidence on the day of the training
- A reusable lesson plan that others can use to facilitate the session

Implement:

A skilled trainer engages the learners and brings the lesson plan to life in this phase. Participants get practical information that they may practise and implement in their workplaces as the course progresses. This might have a huge positive impact on their businesses. An teacher, guide, coach, or facilitator should be the trainer. Adult learning concepts should be acquainted to trainers, and they should review them before joining a training session so that they can best incorporate them into their facilitation. It is critical to prepare participants for the training session by assisting them in identifying their own particular learning goals and assisting them in being "present" for the experience.

Presenting new information is critical to implementing a session. Lecture can be effective if you actively elicit group participation or stop every 10 minutes and instruct participants to share their thoughts and questions in pairs or small groups. Otherwise, it's best to use more engaging and interactive forms of presenting new information. Ideally in the development phase, you've identified several methods and activities for presenting new information. The trainer's goal in the implementation phase is to use methods that the participants will be most responsive to.

The benefits of well-implemented training include:

- Learners who remain engaged throughout the session
- The sharing of knowledge and skills that learners can apply in their workplaces
- Satisfied participants and community organizations

Evaluate:

Although evaluation is the last phase of the process, it actually occurs at every point along the way: analysis, design, development, during implementation, and after implementation. In the early phases, you're evaluating the work you've done and your preparedness to move into the next phase.

The design phase is when you identify the intended outcomes of the training session and their indicators. This is the best time to ask yourself how you will know whether the learning objectives have been met and what kind of impact the session has had on participants' behaviors.

During implementation, you're evaluating your participants' knowledge and body language and adapting your session as you go to meet their needs. Trainers often ask learners to reflect on the impact and quality of the training at the end of the session through an evaluation form. This is one way to measure whether you met the objectives of the session.

And finally, after implementation, you are evaluating whether the session led to changes in behavior for the participants. Great training organizations check back to see how these changes in behavior have affected the organizations, their practices, and their outcomes.

There are many benefits to evaluation, which include:

- Targeted and engaging training
- Improved services offered by your organization
- Ability to prove training impact and gain funding

This are the component of system approach in education, which is functions the interrelated and interdependently each other and to run the entire process.

Stages of System Approach in Education :

The various stages in the systems approach-

(a) **Consider target population characteristics and topic area:** The range of backgrounds, knowledge, attitudes and skills of students coming on to the course will have a strong influence on course design. Pre-knowledge and any common

misconceptions will have to be catered for in the design of the course (these may, for example, affect sequence, structure and support mechanisms).

(b) Estimate relevant existing skills and knowledge of learners: There may be minimum standards of entry to the course, but this will not always be so. For example, the increasing numbers of non-standard and mature student entrants to higher education will not necessarily have conventional paper qualifications, but may possess skills and qualities which will have an influence on course design. This may have implications for teaching methods, bridging courses, support systems etc.

(c) Formulate objectives/learning outcomes: The objectives and learning outcomes of the course or curriculum element will attempt to encapsulate the new skills, knowledge or attitudes which it is intended that the students will acquire. They may be formulated by the learners themselves, by employers, by teaching staff, by a validating, examining or professional body, or by some combination of these and other sources.

(d) Select appropriate instructional methods: Having specified the objectives and learning outcomes, we should be in a better position to select appropriate teaching/ learning methods through which objectives have a reasonable chance of being achieved .There are far more teaching methods available to choose from than most people realize.

(e) Operate course or curriculum: The next element in the system is the actual implementation of the course. This involves all the logistical arrangements associated with running the course, including overall structuring, pacing, implementing the chosen teaching strategies, using appropriate supportive media and materials, and ensuring that all aspects of the course run as smoothly as possible.

(f) Assess and evaluate: The assessments should be closely related to the specified course objectives and learning outcomes. Poorly achieved objectives or learning outcomes should lead the course designers to examine the entire system in order to identify places where improvements might be made. This could involve a change in the objectives and learning outcomes, a revised assessment of students' pre-knowledge and a critical review of the instructional methods used. These deliberations, together with feedback on the course from staff, students, employers, etc, can be used in an evaluation of the entire concept of the course, which should, in turn, form the basis of an on-going cyclical course development process. If a teacher wants to apply the instructional systems approach in the field of education, then he will have to apply a systematic methodology for each step. He will have to follow the eight steps as displayed.

2.5 Problems of Implementing Systems Approach in Education

The Systems Approach is not a new concept, but its application in modern education is new. It has developed from systems engineering, but all the areas of the systems approach cannot be totally used in education system. Researchers are going on and some problems had been identified. There are several issues which can be create problems or obstacles for implementing the system approach in education. Some of them are given below:

Time management:

Systems approach has been very effectively used in industry but in education it is still in its infancy. The reason behind may be that the resultant effect of the process takes a long time but the time period in educational institutions are limited. So it requires time management and continuous in this field.

Not a panacea:

It should be clearly considered that Systems approach is not a panacea for all ills of educational system.

Old systems are difficult to remove:

There is always resistance to new methods or approach. So it takes time to remove the old.

Curriculum:

Too much matter crammed into the curriculum leads to frustration. Also, if students do not understand the relevance of what they are learning, they will not be ready to learn. Following a System Approach will greatly help to prepare a balanced curriculum that is broken down and arranged into rational parts.

Proper identification of problem:

In education, problem means some goal or objective or issue. Eg. Poor command over a subject, discipline issue, language problem, etc. System approach will help to properly identify the problem so that we can then work towards a viable solution.

Hard work:

Systems approach requires hard work and continuous programming of the effects of the system.

Teaching approach:

System approach will help to follow a teaching approach that moves logically from simple to difficult and from known to unknown. This helps the students to move systematically from the lower levels to the higher levels of cognition for better understanding.

Divergent thinking:

System Approach encourages the Teacher to think divergently and out-of-the-box without being prejudiced by pre-conditioning so the output gained is creative, innovative and productive.

Scientific technique:

Since System Approach follows certain logical steps, it is a very scientific way of resolving any issues and finding appropriate alternatives.

Better organization and Planning:

System approach encourages proper organization and planning of one's approach. So ultimately, all forms of chaos and mismanagement can be avoided in the classroom.

2.6 Summary

The concept of systems approach is relatively a new approach emerged in the field of education for managing its affairs. Historically, the concept originated during World War II as a result of the research and development in the context of the complex man-machine system. Gradually, it was applied in the areas of industry and management. Lately, it has been introduced in the field of education as a strategy to manage, control and improve the processes and products of education. In its application, the systems approach is based on the systems concept and its basic parameters. In this unit we have to discussed about the concept, nature and scope of system approach in education the explain the basic components of system approach and their interrelationship. Also discussed the various Problems of implementing systems approach in education.

2.7 Self-Assessment Questions

1. What do you mean by System?
2. Define System Approach in Education.
3. Mention two scope of System Approach.

4. Write the component of System Approach in education.
5. Explain the needs of System Approach in education.
6. Discussed the Problems of implementing systems approach in education

2.8 Reference

Aggarwal, J. C. (2009). Essentials of Educational Technology. New Delhi: Vikas Publishing House.

Kochhar, S. K. (1985). Methods and Techniques of Teaching. New Delhi: Sterling Publishers.

Mangal, S. K.(2001). Foundation of Educational Technology. Ludhiana: Tendon Publication.

Mayer, R. E. (2005). Cambridge handbook of multimedia learning. New York, NY: Cambridge University Press.

Mangal, S.K. & Mangal, U.(2016),. Essentials of Educational Technology, PHI publication, Delhi.

Mohanty, J,.(2008) Educational Technology, Deep and Deep Publications PVT. LTD, New Delhi.

Sampath, K., A. Panneerselvam, S. Santhanam. (2007). Introduction to Educational Technology. New Delhi: Sterling Publishers.

Shankala, D.P. (2006). Educational Technology. New Delhi: Adhyayan Publishers and Distributors.

Sharma, K. K. (2007). Educational Technology. Delhi: Mahaveer & Sons Publishers and Distributors.

Sharma, R. A. (2002). Technology of Teaching. Meerut: International Publishing House.

Unit-3 ❑ Classroom Communications

Structure

3.1 Objectives

After completion of the Unit, learners will be able to:

- Understand the concept and scope of Educational Process and Communication Technology.
- Explain the scope of Educational Process and Communication Technology.
- Be acquainted with the Basic Model of Communication Technology for Classroom Interactions.
- Explain the various Factors that can effect Classroom Communication.

3.2 Introduction

Globalization and technological change processes that have accelerated in tandem over the past years have created a new global economy powered by technology, fueled by information and driven by knowledge. The emergence of this new global economy has serious implications for the nature and purpose of educational institutions. In this unit we have to discuss about the concept, nature and scopeof educational process and communication technology. Various eminent educationist frame the model based on communication technology for classroom interaction. So, this unit is also

highlight the models of communication technology for classroom interaction.

In this unit also discuss the various factors which is affected the classroom communication.

3.3 Educational Process and Communication Technology: Concept and Scope

3.3.1 Concept:

Communication Technology is comprised of two words like—Communication & Technology. We have already discussed that technology is the science of the application of knowledge to practical purposes. You also know that information means any communication or representation of knowledge in any form. Now we will know what communication is? Communication is an integral part of human existence. It is communication that decides the very identity of human beings. Modern society is turning into an information society and communication is the exchange of information. It is the process & transferring information form a sender to a receiver with the use of a medium in which the communication information is understood by both sender and receiver.

Communication Technology implies the knowledge, skills and understanding needed to exchange information verbally or non-verbally. It is processing of information in terms of accessing information, decoding information and sending it via a medium and changer to the receivers. Medium or channel can be written or oral or gesture form of information through speech, action or any electronic machine.

Communication Technology is the electronic systems used for communication between individuals or groups. It facilitates communication between individuals or groups. Who are not physically present at the same location? Systems such as telephone, telex, Fax, radio, T.V. and Video are included, as well as more recent computer based technologies, including electronic data interchange and e-mail.

In short, communication technology is the activity of designing and constructing and maintaining communication systems.

3.3.2 Scope:

Mass education:

There has been explosion of population and knowledge. There is, therefore, a need to educate the masses. The problem is multiplied further by having a large section of illiterate people. So, ICT has a tremendous application to educate a large

section of people and to impart a large amount of knowledge in a limited span of time. In this regard, the mass media viz., TV, radio, and other modern technologies like computers and information technology (E-mail, internet, mobile, etc.) has a lot of scope. The illiterate masses can also be made literate with the help of innovative methods and practices of teaching and learning.

Historical information:

Any branch of knowledge that we deal with has a historical base. Such information is of tremendous importance for the students to understand any branch of knowledge in its totality. Such incidents when occur can be recorded with the help of audio-video CD. Such audio-video, CD becomes the source of information for learners to learn. The main advantage of such CDs is that we cannot create or repeat the history once more howsoever we try hard and place it before the learner. For example, can we have the same view of the explosion of Hiroshima and Nagasaki (1946) and show it to our students? This is neither feasible nor possible. Further, for example, we cannot have the same view of Nuclear test conducted at Pokhran (1998). So such records.....in the form of a film taken when the incident is happening are of immense value to the learners which ICT can only provide.

Costly and hazardous experiments:

In many fields of science and technology there are some experiments having great implications for effective learning which are not advisable for the teacher to conduct in the classroom because of cost and health hazards involved. Such experiments, once conducted carefully in the laboratory or elsewhere can be recorded with the help of new information and communication technology and be used by teachers and students for effective learning.

Gaming and simulation:

If historical events which are either costly or hazardous which cannot be conducted, then ICT can rescue us by doing the same through simulation. Computer technology in this regard plays the main role. This can provide a life like picture of phenomena in three dimensions (3D). It can also show the operation of different parts of a phenomenon and the consequences. The other possibility is games. Children can learn, through play, many concepts that just cannot be taught in the formal set of the classroom. The gaming and simulation has a great scope in the training of military personnel and in the field of aviation.

Distance education:

ICT has a great scope in distance education and open school programme. Today there is a great need for personnel training and education on regular basis for updating oneself in the field of work. In this regard, distance education programmes, a relatively less formal process of education, have acquired new status. Educational technology with its innovative practices can educate the learners who cannot come to the classroom setup for their education. In this regard programmed learning materials, modules, contact programme, and counselling are some innovations which can help distance learners.

Collection, storing and retrieval of information:

There are digital cameras and mobiles which provide us the facility to take same photographs of events that take place in a fraction of second. There are also sate lites that work for us day and night to provide us information about places which are not accessible to us. Information can be collected with the help of this new electronic technology both in audio and in video form. Such information can be stored with magnetic and electronic devices easily and can be retrieved within no time.

Research:

As mentioned earlier, information can be collected and stored to be used for educational purposes. Information can also be collected and stored in the same way for research. Further, for analysis and reporting, computer can be used. Not only quantitative data but also qualitative data can be analaysed and there lies the role of computer and the different methods of data analysis methods and techniques.
Moreover, in developmental type of research, different kinds of packages can be developed for raising the effectiveness of learning. There are many researches already conducted in this field i.e., computer assisted instruction (CAI), and computer assisted language learning packages.

3.4 Basic Model of Communication Technology for Classroom Interactions

Models of Communication :

Before discussing the models of communication, let us first understand what the term 'model' means. A model is a graphic representation designed to explain the way a variable works. It is a pattern, plan, representation, or description designed to show

the structure or workings of an object, system, or concept. A model of communication offers a convenient way to think about it by providing a graphical checklist of its various elements. Some of the important models discussed in this section highlight the complexities of the process of communication.

The Greek philosopher Aristotle looked at communication from the rhetorical perspective i.e. speaking to the masses to influence them and thus persuade them. Aristotle constructed a model with three elements: Speaker-Speech-Audience in which the basic function of communication was to persuade the other party. This is accepted by many as the first model of communication. Thereafter in the twentieth century many more models came up. In the latter part of the century, the concept of communication changed due to the advent of various mass communication media such as newspapers, radio, and television. During the First and Second World Wars, communication was also used for propaganda and it was perceived as a magic bullet that transferred ideas and knowledge automatically from one mind to another.

Some important models of communication are Lasswell Model, Shanon and Weaver Model, Osgoods Model and Schramm Model. Let US now discuss these models.

Lasswell Model (1948):

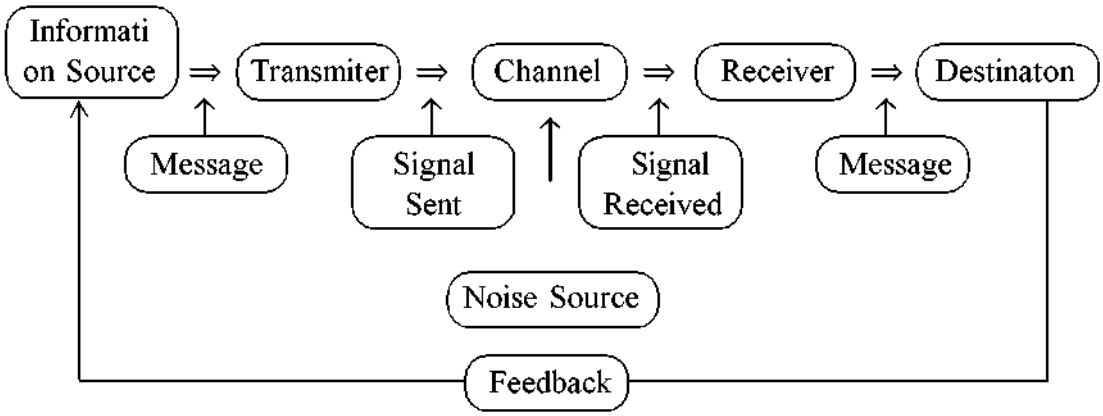
One of the early models of communication was developed by the political scientist Harold D. Lasswell who looked at communication in the form of a question:

- **Who**
- **Says What**
- **In Which Channel**
- **To Whom**
- **With What Effect**

This verbal model focused attention on the essential elements of communication and identified the areas of communication research. 'Who' raises the question of identification of the source of the message? 'Says what ' is the subject of analysis of the message. Communication channel is the medium through which the message has traveled. 'To whom' deals with the characteristics of the receivers and audience and 'what effect' can be seen as evaluation of the effect of the message? These essentially comprise the basic components of communication. This model implied that more than one channel could carry a message. It was considered an oversimplified model which implied the presence of a communicator and a purposive message.

Shannon and Weaver Model (1949):

This model of Claude Shannon and Warren Weaver has been considered as one of the most important models of communication and it has led to the development of many other models. It is referred to as the transmission model of communication as it involves signal transmission for communication.



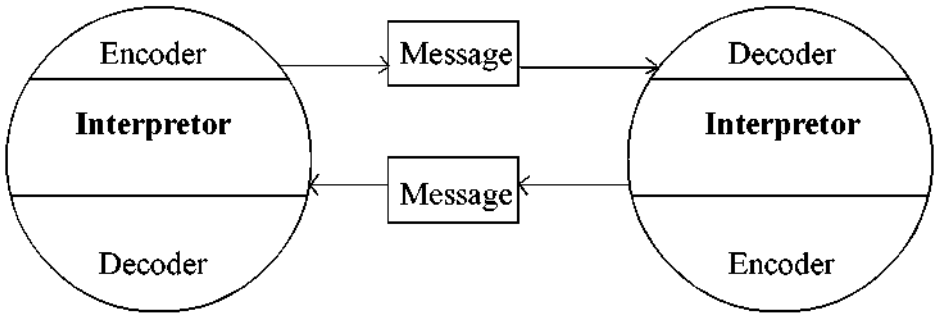
In this model, the information source produces a message to be communicated out of a set of possible messages. The message may consist of spoken or written word. The transmitter converts the message into a signal suitable for the channel to be used. The channel is the medium that transmits the signal from the transmitter to the receiver. The receiver performs the inverse operation of the transmitter by reconstructing the message from the signal. The destination is the person or thing for whom/which the message is intended.

This model introduced the concepts like 'noise' i.e. disturbances or errors in transmission, problems in accepting the signal (message), etc. and the need for maintaining necessary balance between 'entropy, which means the degree of uncertainty and 'redundancy', which refers to the uniqueness of the information. This implied that for effective communication the greater the noise in communication, the greater is the need for building redundancy i.e. repetition of the message which reduces the relative

entropy or in other words, the uncertainty about the message. This model was criticized for being based on the hardware aspect developed for engineering problems and not for human communication. Another criticism was that it did not take the element of feedback into account.

Charles Osgood's Model (1954):

Osgood in his model showed communication, as a dynamic process in which there is an interactive relationship between the source and the receiver of the message (M). An individual engaged in the communication process sends as well as receives messages and as such encodes, decodes and interprets messages through a number of feedback mechanisms.



Osgood stressed the social nature of communication. This model was found more applicable in interpersonal communication in which the source and receiver were physically present. For example when a teacher teaches, the learners interact by raising queries, answering questions, etc. The role of interpretation of the message has also been highlighted in this model for decoding a message.

Schramm Model (1954) :

Wilbur Schramm, a well-known communication expert did not make a sharp distinction between technical and non-technical communication. But drawing upon the ideas of Shannon and Osgoods Schramm proceeded from a simple human communication model to a more complicated one.
His first model has a lot of similarity with Shannon and Weaver Model.

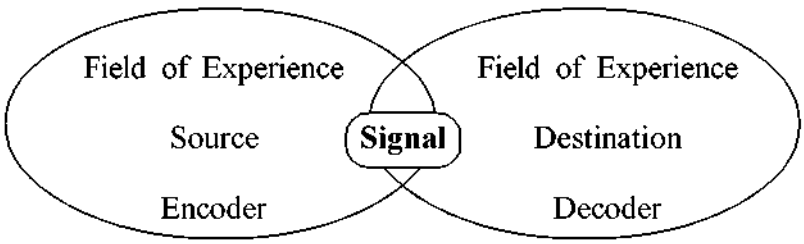
Source $\rightarrow$ Encoder $\rightarrow$ Singal $\rightarrow$ Decoder $\rightarrow$ Destination

In the second model Schramm visualized the process of communication as a process of sharing of experience and commonality of experience of those communicating. It introduced the concept of shared orientation between sender and receiver.

The circles in this model indicate the accumulated experience of two individuals engaged in communication. The source can encode and the destination can decode in terms of the experience.

In this model the accumulated experience of two individuals engaged in communication is emphasized unlike in the linear models discussed earlier in which interaction, feedback and sharing of experiences find no place. The source can encode and the destination can decode in terms of the experiences each has had. Communication becomes easy as both the participants have a common field of experience. If the circles do not meet there is an absence of such common experience which makes the process of communication difficult.

Schramm further elaborated his model by highlighting the frames of reference of the persons engaged in communication. He took into account the wider social situations and the relationships of both source and destination. He maintained that when both have the same kind of situations, the message is selected, received, and interpreted according to the frames of references in which noise and feedback play important roles. He also included the idea of feedback by expressing that communication is reciprocal, two-way, even though the feedback may be delayed. The weakness of this model is that it is a less linear model, but it still holds good for bilateral communication. The complex, multiple levels of communication among several sources that may take place simultaneously, say in a group discussion, is not accounted for.



The linear models of communication held that a message flows only from the sources to the recipient as for instance from a radio to a listener. Later on the interactive model was developed which takes into account bilateral communication. Then the transactional model of communication was developed. It includes the components of linear model as well as the interactive ones. It emphasizes both the content, i.e. what is being communicated and also includes the component of relationship of the source and the recipient.

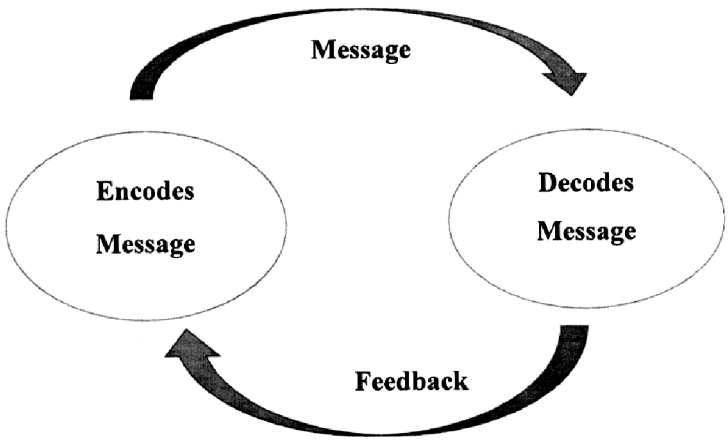
Example :

A teacher and learners will interact more if the content taught is based upon the experience of the learners and also if the teacher is friendly and has a good relationship with the learners, there will be more interactions.

Interactive Model of Communication:

As online written interaction is a platform of interaction, it is prominent to be concern on in an academic communication for learners. This is because learners need to write virtually that may lead them face various writing problems of their learning as linguistic, psychological, cognitive and pedagogical setbacks (Haider 2012; Hyland 2003 in Fareed, Ashraf, & Bilal 2016, p. 82) or known as noise. In regard to that, to develop online written interaction to be in an interactive process, they need to practice the language and academicians need to observe appropriate content matters in achieving educational objectives accordingly (Ndongko & Agu, 1985). Below is the Interactive Communication Model of learners' academic online written interaction.

All communication process in the online medium-employed in academic setting starts with a learner, that has a thought or information to pass on to other learners or classmates. In the interactive communication as in Figure 3 depicts that thought would first go through an element called the encoder, which will change our thought into codes. Schramm (1955) in Wood (2009) claimed that encoding is actually an act of translating specific thoughts into codes (message) that is then transferred to another person, which will decode the codes (message), and interpret the meaning. The second part of the communication is the feedback or response of the receiver that goes through the process of encoding, and then delivered back to the original sender as they decoded the message (Essays, UK, 2018). Thus, this communication model is a two-way process of interaction.



In this communication model, both the sender and the receiver take turns to speak and listen to each other. As a result, the feedback its feedback is given (encode

or decode) either verbally or nonverbally, or in both ways. This model also illustrates that the sender and receiver communicate better if they have common fields of experience which includes their cultural background or general personal experiences that overlaps in their interaction. However, the drawback in the interactive communication model is that it does not indicate that communicators can both send and receive messages simultaneously. This model also fails to show that communication is a dynamic process which changes over time.

According to Bajracharya (2018), this communication process can take place between humans or machines as example instant messaging system or electronic mail (e-mail). Internet can be taken as the best way of interactive communication example as receiver that can give feedback even in newspapers and books. This is where online written interaction submerges in the category of Interactive Communication Model. Especially, the use of Internet in the interaction has increased the opportunity of interactive communication between learners and it is evolving. In particular, this communication model perceives human computer interaction is also now considered as interactive communication as the model is circular where the senders interchange every time. Social media, interactive marketing and user generated contents, auto-teller machines (ATM), online shopping, and chat rooms, are other examples of interactive communication model as well.

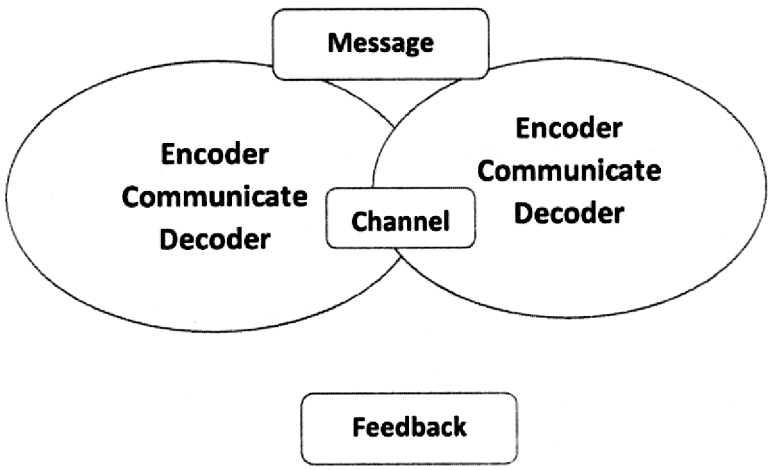
However in academic setting, this model also deals with noise and barriers to communications like language or network problems which affects the communication process. There is an open distorted line of communication in this interactive communication model of online written interaction. Furthermore, in this communication model, it has no engagement of sender and receiver in communication which in academic setting it is important to develop such soft skills to gain intellectual connection. Also, the communication between learners can be linear if the receiver (regardless human or computer) does not respond. Even it is a relatively new model of communication for new technologies; yet, being instant or synchronous interactive is taken to be a very important aspect in building effective communication in academic setting.

Transactional Model of Communication:

It is basically a shared understanding of the information expressed and exchanged in reaching mutual meaning regardless among human-human or human-computer interaction. It is a continuous process which the roles of sender, receiver and the message in the interaction unfold. This model describes 'transaction' as the ongoing and continuously changing process of communication that is on sending and receiving messages is reciprocal (Barnlund 1962) as in. The communicators (the sender and

receiver) are responsible of the effect and effectiveness of the communication that they need to build a shared meaning of the message as each communicator act as both sender and receiver simultaneously.

Besides that, in this model namely; both of verbal and non-verbal behavioral cues, communication environment and noise are parts of the message. Each communicator reacts depending on the factors of their background, prior experiences, attitudes, cultural beliefs and self-esteem (Amudavalli n.d). According to Ashman (2016), she claimed that this model denotes people communicate to create relationship, form intercultural alliances, shape their self-concepts and engage with others in dialogue to create communities. In short, this model considers on how social, relational and cultural contexts frame or influence the communication process as well.



The difference of this model in comparison to the aforementioned ones, is that the transactional model acknowledges the circular nature of communication that is endless in which the sender and receiver, vice versa continuously or simultaneously changes their role depending on the communication. This helps to improve the understanding of communication between two parties rather than a one way linear model that does not represent the nature of communication in real life. This is vital in such online written interaction context especially it is in an academic setting. It is a dynamic model that shows of how a situation can change which reflects communication is not generally one sided merely.

This model also does not separate between sender and receiver, as both sender and receiver is the same person that it is an essential part of communication. This is due to the fact of communication moves in a circular manner (Essays, UK, 2018),

especially in the context of online written interaction. It is a more active communication models rather than the linear model that its receivers are assumed passive. This is because Transactional Model emphasizes on the feedback feature to be central of the communication model. In particular, in this model the relationship between sender and receiver governs the communication model such as they construct meaning that leads to develop relationship. However, at times the context is a combination of the channel and noise during the communication that turns into a major influence as how distortion the message would be received and the response given.

As example, while Learner A is interacting, Learner B is constantly giving feedback on what she or he thinks through virtual or textual expression (or verbal feedback in face-to-face interaction) without necessarily stopping Learner A from interacting. Such context and the different combinations that may occur combined with the different types of noise that play a subtle role in influencing communication that would lead to miscommunication or distorted message's content. It shows that the elements in this model of communication are interdependent as in online written interaction, learners would keep exchanging messages with other learners and every elements of a communication process (sender, encode, message, channel, receiver, decode, noise and feedback) which would affect their interaction.

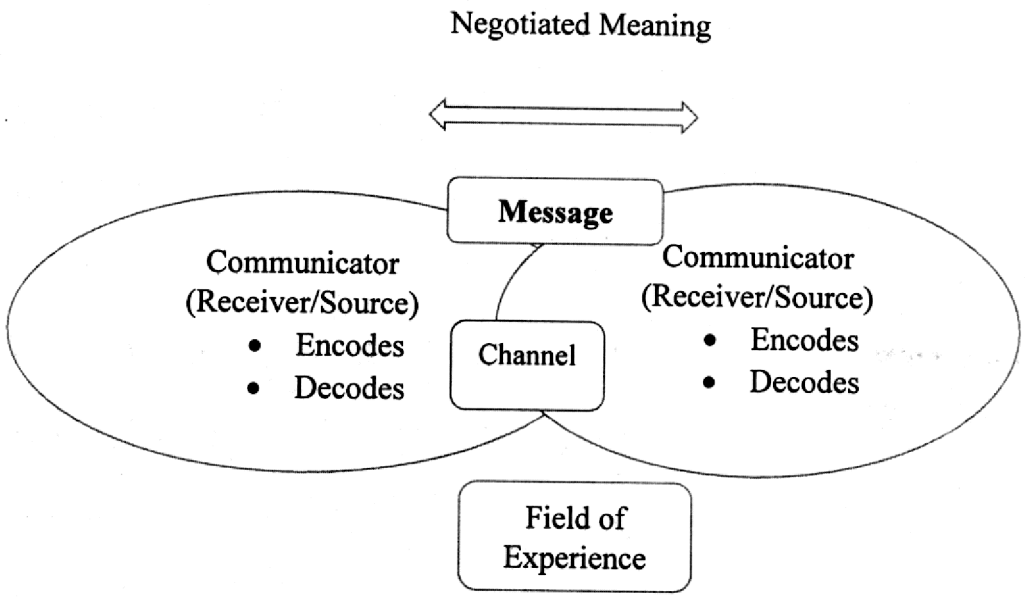
This reflects that this continuous two-way process of communication, Transactional Model, is parallel with the process of online written interaction in academic setting, as it is in line with the asynchronous concept and active communication between communicators, the learners (senders and receivers). Yet, as this communication is instant and continuous, this communication model is a meaning centered model. Both sender and receiver (learners) must understand the codes sent by the other in order to achieve effective communication in which they shared meaning that leads to a significant teaching and learning session among them.

Confer Model of Communication Process:

This is a conceptual model of communication process in online written interaction as known as, Confer Model of Communication Process, in which this article discusses and provides with such objectives. This communication process focuses on negotiated meaning or common ground, when communicators are trying to describe communication (Pearce & Cronen, 1980; Praeger, Cronen, & Pearce, 1982) among them, which are the learners or educators. This process of communication is as well a two-way

process and continuous communication in which they are the combination of

Interactive and Transactional Model of communication processes. These two models of communication process were integrated as its circle of communication processes overlaps and frames the messages sent. It fits with the academic setting in fulfilling such teaching and learning approach in employing online written interaction among learners along or educators; synchronous and asynchronous setting.



Yet, it depends on which kind of medium do the lesson employed as videoconferencing, LMS, e-mail or forum as well as it depends on the educational objectives of the lesson would be. In addition, in order to communicate, they must each realize and aware of the terms or messages means to the other communicators, and establish common ground, in order to fully understand the request and provide answers or responds in the interaction. This is because they need to negotiate meaning of the interaction occurred among them to retrieve the common ground of their lesson. Especially, both communicators are the receiver and source of the communication.

Furthermore, both communicators play their role in encoding and decoding the message and feedback respectively. Besides that, this model focuses on few perspectives in mind on how it affects the interaction among learners or instructors that planned to achieve the aimed educational outcomes of employing the online setting approach in the lessons.

3.5 Factors Affecting Classroom Communication

The quality and effectiveness of the process of communication is affected favourably or adversely through the presence of some other intervening variables lying between the source of communication and the receiver. These variables according to their nature, helping or obstructing the path or communication maybe termed as facilitators or barriers of communication. The presence of congenial, physical, psychological and environmental conditions and facilities available for effective communication may facilitate and help in providing the desirable effectiveness to the communication system. Barriers may cause simple communication gaps or total failure of communication. Some major barriers of communication are as follows:

Lack of common language:

Language uses oral or written symbols to transmit messages from one person to another. If the sender and the receiver of a message do not belong to the same language group, then this deficiency will pose an obstacle to the process of communication. The sender and the receiver will not be able to communicate with each other if they do not know a common language. Communication will not be possible between a boy who can only speak only in English and another boy who can only speak in French.

Semantic barrier :

It is possible for one word to have many different meanings. It is not necessary for the meaning that is ascribed to a word by the communicator to be the same as that ascribed by the receiver to the same word. One word can have different meaning for different people at different points of time. Hence, it is possible that the sender and the receiver, most of the time, ascribe different meanings to the same word. Occasionally, they might possibly make use of dissimilar words to communicate the same meaning.

Poor listening:

Poor listening skills are one of the chief problems while communicating. If people are attentive in listening a lot of misunderstanding can be reduced. A large number of people do not pay value added attention to the message because of a variety of disturbances, feelings, enthusiasm, absence of interest, unwarranted assertiveness and roving concentration. This usually leads to misunderstanding and conflict.

Poor vocabulary:

Low level of vocabulary is an obstacle to the communicator in conveying the message in its exact form. It makes the message more complicated and reduces its effectiveness. If the recipient cannot figure out the words, he will not be able to comprehend the sentences.

Noise:

A lot of noise also affects communication. Noise is usually, but not always, in the form of sounds. It can be visual, audio-visual, written, physical or psychological. Noise, in a physical form denotes the loud noise made by machines or speaker or other such things. Noise occurs when a student arrives late for a class and his arrival becomes a source of distraction for others in that class. Bad handwriting and incorrect typing leads to written noise. Psychological noise refers to mental trouble and turmoil, inattentiveness and indifference.

Time:

Time factor may also hinder the process of communication. For example, a phone call at midnight may irritate the receiver and he may not listen to the communicator. Thus, his communication becomes ineffective. The best of communication may prove to be ineffective if it does not take place at the right time.

Distance:

The distance between one who communicates the message and one who receives it may be a strong obstacle to communication. This can be due to absence of technical equipment such as telephone, telefax, for linking them. An unfavourable system of seating in the classroom can give rise to a type of communication gap, which can be eradicated by making adjustments in the distance.

Attitudes and values:

People interpret messages on the basis of their attitudes and values. If a message is adverse for the receiver, it will not be able to persuade him easily. Thus, personal attitudes, values and opinions are transformed into obstacles, in the process of effective communication. Negative attitude of a teacher or a student may affect communication in the classroom.

Emotional barrier:

Emotions refer to the way we feel about the world around us. Constructive emotions like happiness, adoration or liking make the flow of communication smooth.

However, negative emotions like fear, distrust, anger, anxiety and hatred, work as powerful hindrances to efficient means of communication.

Different perceptions:

Different perceptions of different people have their own limitations. According to Francis Bacon, 'man prefers to believe what he prefers to be true'. Our reality is created by us with the help of selective perception. This conceals specific things that are present and reveals other more specific things, in addition to those which are already present. Every person's experience and his way of interpreting things are never the same since every person has a perception of his own. A communication barrier emerges, when the same object or concept is interpreted differently by two or more people.

Wrong channel:

At times, simple rules for selection of a channel cause more problems than they solve. In selection of a channel, the sender needs to be sensitive to things like complexity of message, consequences of a misunderstanding, knowledge, skills and abilities of the receiver and timely response on receiving the message.

Poor retention:

There is a limit to the functioning of human memory. Everything that is said cannot be always retained. The retention is even lower if the receiver is not interested or attentive. This causes a breakdown in the process of communication.

Closed mindedness:

It is not at all easy to communicate with a person with intense prejudice. This type of a person is not ready to receive any message on a subject about which he believes that he knows everything. His mind is closed to new ideas, facts and proposals. Hence, he completely rejects the information and recommendations of the communicator, even before he knows the real facts.

Physical distractions:

Physical distractions are physical things that interrupt communication. For example, uncomfortable seating arrangement makes it difficult for a learner to concentrate on the communication.

Lack of proper feedback:

Without feedback, communication is one-way. Feedback in terms of proper

motivation, incentives, zeal and enthusiasm is needed on the part of the sender and the receiver. If, in a classroom the teacher is not getting feedback of his teaching, he may never achieve the actual goal of teaching.

Too much information:

Excess of information also acts as a communication barrier. A lot of information faces many drawbacks and different respondents react differently to filter the information and receive only what they need. Hence, for effective communication, the amount of information can be reduced.

STRATEGIES FOR EFFECTIVE COMMUNICATION:

Some of the ways of facilitating effective communication could be: clarity of message, reinforcement of ideas, selection of appropriate channel, motivation, proper environment and feedback. Let us elaborate each of these ways.

Clarity of message:

In any type of communication, it is important that the objective of communication is well defined, the level of language is kept simple, brief and clear. It has been found that most of the complex ideas can be presented simply. Short and simple sentences can express an idea completely, coherently and cogently. Too many conjunctions make a sentence complex and difficult to understand. Proper phrasing, punctuation, emphasis, voice modulation facilitates alarity of message and increases the impact of communication.

Reinforcement of ideas:

For clarity of the message, an element of redundancy needs to be introduced. Difficult or technical work is and expressions need to be substituted with simpler expressions and words of everyday usage. However, care needs to be taken to see that the message does not become repetitive and boring. The level of audience needs to be constantly kept in mind.

Appropriate channel:

Depending upon the type and objective of communication, selection of appropriate channel is crucial for the success of communication. The use I of technology also helps to overcome geographical barriers. However, for selecting a particular channel, especially the more expensive one, some questions need to be constantly asked such as why this channel? Is there any specific need? Will it help to meet the objective of communication'? Is it possible to avoid unnecessary investment? and so on. Many

a time, a simple channel may convey a message more effectively as compared to the more glamorous ones.

Motivation:

Motivation also helps to remove some of the barriers, especially psychological and socio-cultural barriers. The receivers in the communication process need to be encouraged to express their views, opinions and doubts. They need to be drawn into the interactive process by persuading them to pose questions. Appreciation of their (receivers) views increases their self-esteem and builds confidence.

Proper environment:

Proper seating arrangements, visibility of the source and relatively comfortable environment facilitate communication. This is especially conducive in overcoming some of the physical barriers discussed above.

Feedback:

Feedback is an integral component of any communication activity. Regular feedback at appropriate levels facilitates understanding of the needs and views of the receivers. It helps to bridge the gaps, if any, in the communication approach and improves the process of communication.

3.6 Summary

Educational Technology is composed of two words—education and technology. Communication is that process in which people exchange thoughts to each other by means of general awareness. According to Lugis and Vegal—"Communication is that process which changes the ideas, opinions and attitudes of people by using information, instructions and decision under the social system." Communication is social process which establishes human relationships, strengthens them and develops them.

Communication process is bounded in social structure in such way that it is not possible to imagine a social life without communication.

In this Unit, discussed the various model of Classroom communication and the affects of classroom communication.

3.7 Self-Assessment Questions

1. What do you mean by Communication Technology ?
2. Define the term "Communication Technology".

3. Explain the Scope Communication Technology.
4. Elaborate the Basic Model of Communication Technology for Classroom Interactions;
5. Discuss the Factors Affecting Classroom Communication.

3.8 Reference

Aggarwal, J. C. (2009). Essentials of Educational Technology. New Delhi: Vikas Publishing House.

Kochhar, S. K. (1985). Methods and Techniques of Teaching. New Delhi: Sterling Publishers.

Mangal, S. K.(2001). Foundation of Educational Technology. Ludhiana: Tendon Publication.

Mayer, R. E. (2005). Cambridge handbook of multimedia learning. New York, NY: Cambridge University Press.

Mangal, S.K. & Mangal, U.(2016),. Essentials of Educational Technology, PHI publication, Delhi

Mohanty, J,.(2008) Educational Technology, Deep and Deep Publications PVT. LTD, New Delhi

Sampath, K., A. Panneerselvam, S. Santhanam. (2007). Introduction to Educational Technology. New Delhi: Sterling Publishers.

Shankala, D.P. (2006). Educational Technology. New Delhi: Adhyayan Publishers and Distributors.

Sharma, K. K. (2007). Educational Technology. Delhi: Mahaveer & Sons Publishers and Distributors.

Sharma, R. A. (2002). Technology of Teaching. Meerut: International Publishing House.

Module-II

Technology Adoption in Education

Unit-4 ❑ Hardware Technology in Education

Structure

4.1 Objective

After the completion of the Course, the learners will be able to —

- Understand the use of Hardware Technology in Education: Audio, Visual, Audio-visual and Computer
- Explain the application of Audio, Visual, Audio-visual and Computer in Education.
- Know the meaning of Overhead Projector, Multi-media and Smart Classroom and its implication

- Be acquainted with the Information and Communication Technology and E- Learning.
- Realize the importance of Information and Communication Technology(ICT) and E-Learning in the present higher education system.

4.2 Introduction

The hardware technology refers to the use of machines and other mechanical devices in the process of education. Its origin lies in the application of "physical science" to education and training system. The process of teaching-learning has been gradually mechanized through the use of teaching machines, Audio, visual, audio-visual, computer, projectors etc. The teacher can deal with a larger group of students at the same time by his discourse through these technology. The hardware technology is based on the application of engineering principles for developing electro-mechanical equipment for instructional purposes. Motion pictures, tape recorders, television, teaching machines, computers are called educational hardware. Hardware approach mechanizes the process of teaching so that teachers would be able to deal with more students with less expenditures in educating them. In this unit we have to highlight the concept and significance of overhead projector, multi-media and smart classroom, also discuss the meaning , nature and importance of information and communication technology and E-learning.

4.3 Use of Hardware Technology in Education: Audio, Visual, Audio-visual and Computer

In the educational process, the hardware approach refers to the use of machines and other mechanical devices. Its roots can be traced back to the application of "physical science" to the educational and training system. The usage of teaching machines, radio, television, tape recorders, videotapes, projectors, and other electronic devices has steadily mechanised the teaching-learning process. The teacher can address a bigger group of students at once by using these machines to deliver his message.

The hardware approach is based on the application of engineering principles for developing electro-mechanical equipment for instructional purposes. Motion pictures, tape recorders, television, teaching machines, computers are called educational hardware. Hardware approach mechanises the process of teaching so that teachers would be able to deal with more students with less expenditures in educating them.

4.3.1 Audio:

Audio means what we hear. The five senses eyes, ears, touch, smell and taste plays an important role in communicating message. Hearing plays an important role in receiving and sending a message effectively. The most basic form of communication is oral and face to face contact. So hearing plays an important role in oral, fact to face communication. The aids that involve the sense of hearing are called Audio aids. For example:- radio, tape recorder, gramophone etc.

In the classroom situation, the tape recorder, the record player or the gramophone plus radio programmes can mainly be used for this purpose, as audio aids help in better learning among learners. However, radio programmes are available for a limited time. As such it is not always possible for the teacher to use them. The best possible way is to record the relevant radio programme on a tape recorder and use it whenever needed by the teacher or the learner.

Record players or gramophones are used when some songs or poems, chorus, prayer, etc., are to be presented. Other programmes can be recorded from radio and if possible from television programmes also. Audio aids help in developing the listening skill. Nowadays audio cassettes are being produced on a large scale. They contain beautiful recitations of nursery rhymes, poems, stories, etc. Apart from serving as a model of good recitation, they also create interest among learners through the various sound effects

Tape Recorder:

A tape recorder is suitable for extension work in meetings, training programmes, campaigns, recording radio programmes, etc.

Advantages:

1. Facilitates on-the-spot recording of sound.
2. Helps in duplication and dissemination of sound.
3. Recorded tape can be immediately played back without any processing.
4. Helps in synchronization of sound with picture.
5. Easy to operate and preserve.
6. Low operational cost, as the same tape may be used again.

Public Address System:

A public address system amplifies sound so that it is audible to a large audience, over a distance. It consists of three segments, viz., microphone, amplifier and speaker.

The microphone converts sounds into electrical waves which are fed into an amplifier. The amplified electric current is fed into a speaker to convert into sound waves, and the magnified sound is heard through speakers. It is very useful in meetings and campaigns to disseminate information.

Telephone and Mobile:

The telephone allows people to talk to each other, from distant places. It provides for instant interpersonal communication, in which the communicator and the person who is communicated to change roles while giving and getting information. This improves speed of communication and involves considerable saving of time, money, and labour. Though, usually, only two persons can communicate at a time through a telephone, the system serves many people in a given area if a speaker is attached to it, like Cell Phone Operated Mobile Audio Communication and Conference System (COMBACCS). This technology is seeing a phenomenal growth in many developing countries. Short Message Service (SMS) and Wireless Application Protocol (WAP) enabled cell phones with cameras can be effective in offering 'always available extension' between experts and people. COMBACCS can help community members at different locations build relationships and understanding.

Digital Audio Player:

A digital audio player is sometimes referred to as an MP3 player, and has the primary function of storing, organizing and playing audio files. Some digital audio players are also referred to as portable media players as they have image viewing and/or video-playing support.

Example : iPod (fourth generation audio aid). Digital audio players are playing a major role in Information and Communication Technology based extension work in all development sectors due to their very compact size, use of very little power, and extremely small designs with long battery life.

Radio Programmes:

Listening to a radio programme needs prior training in listening skills. The learners are to be guided properly before they listen to a radio programme as radio programmes cannot be repeated unless they are immediately recorded. Radio programmes are of two types. One type of radio programme is called education radio broadcasts—which provide scope for participation of teachers and students. They also supplement school activities. You along with your students may listen to the programme and take notes on them.

As a follow-up activity, discuss the programme, the main events, the content, the dialogue, the characters, etc., with the students to evaluate and consolidate their learning. The second category of radio programmes are those where a general discussion on social issues, health and diseases, about the universe etc., is held. Those programmes which you consider useful for your students may be recorded and used to supplement your presentation inside the classroom.

■ **Impact of Audio Aids in Education:**

Teachers have many teaching methods available to reach their students. Using audio aids in teaching can improve student performance by engaging them on a different level. These aids in the classroom can have many advantages including engaging auditory learners, adding novelty to activities and using music or mnemonics as memorization techniques.

Engaging Auditory Learners

According to Howard Gardner's Theory of Multiple Intelligences, students learn in a variety of different ways including through listening or auditory input. Some students are better auditory learners than others and may see more academic improvement when audio aids are used in the classroom. Teachers serve students best by instructing to all academic levels in the classroom. With students learning at different paces and through different methods, using audio aids in teaching is one way of achieving engagement and better retention of ideas. Rather than relying solely on speech through direct instruction, teachers can also include listening activities focused around music, noises and interactive listening assignments.

Novelty Gets Noticed

Students might get bored with more traditional methods. Advantages of audio aids is even more apparent in novelty teaching methods. Novelty audio aids can be used in the classroom as an attention-getting strategy and also as a way to increase student involvement. When experiencing something new that engages his senses, a student is more likely to be engaged in the task and to remember the experience and presented information. Using audio in an unexpected way can add novelty to a lesson and potentially spark an academic improvement. Teachers can try beginning a lesson with a song or use recordings of foreign languages when teaching about other cultures. The more unexpected the audio activity is, the more novel that activity is for the students.

Music and Mnemonics Help Memorization

To define audio aids, teachers might use a mnemonic device. Using music and mnemonics as audio aids in teaching has also been proven to help students with memorization. Mnemonics are phrases or rhymes that people use to memorize information. For example, the memorable saying, "30 days hath September, April, June and November" is a mnemonic device that helps students remember how many days are in each month of the year. When students learn assigned song lyrics or mnemonic devices, the memorized information stays with them longer and can improve their performance on related subject tests.

Advantages:

- Flexible, inexpensive, simple to use, and readily available.
- Recorded and used again and again - Editing and duplication is easy.
- Useful in individual, group, and mass teaching methods.
- Overcomes the illiteracy barrier.
- Audio messages are more dramatic than print messages.
- Portable and can be used in field situations.

Limitations:

- The sequence of presentation is fixed.
- Comprehension of the presentation can be a constraint.
- The development of audio aids is time consuming.
- Storage and retrieval of audio tapes and records is tiresome

4.3.2 VISUAL :

The aids which use sense of vision are called Visual aids. For example :- actual objects, models, pictures, charts, maps, flash cards, flannel board, bulletin board, chalkboard, overhead projector, slides etc. Out of these black board and chalk are the commonest ones.

TYPES OF VISUAL AIDS:

Black Board / Green Board:

It is one of the most common visual aids in use. A chalk board is generally installed facing the class which is either built into the wall or fixed and framed on the wall and provided with a ledge to keep the chalk sticks and duster.

Characteristics of a Good Chalk Board:-

(i) Its surface should be rough enough so that it is capable of holding the writing on the board.

(ii) Its surface should be dull so that it can eliminate glare.

(iii) Its surface should be such that the writing on the board can be easily removed by making use of a cloth or a foam duster.

(iv) Its height should be so adjusted that it is within the easy reach of the teacher and is easily visible to the students.

USE OF BLACK BOARD:

- Write in a clear and legible handwriting the important points on the chalk board but avoid overcrowding of information on the chalk board.
- The size of the words written on black board should be such that they can be seen even by the back-benchers.
- There should be proper arrangement of light in the class room so that the chalk board remains glare free. Stand on one side of the chalk board while explaining some points to the students.
- Students may be allowed to express their ideas on chalk board, or to make alterations or corrections. Books, chart, Model, Painting, Drawing, actual objects, models, pictures, charts, maps, flash cards, flannel board, bulletin board, chalkboard, green board, blackboard, whiteboard, overhead projector, slides , negative roles etc.

Advantages of Chalk Board:

(i) It is a very convenient teaching aid for group teaching.

(ii) It is quite economical and can be used again and again.

(iii) It is one of the most valuable supplementary teaching aid.

(iv) It can be used as a good visual aid for drill and revision.

(v) It is a convenient aid for giving lesson notes to the students.

Bulletin Boards:

It is display board on which learning material on some topic is displayed. It is generally of the size of a black board but sometimes even bigger depending on the wall space available.

Use of Bulletin Board:

(i) Effort be made jointly by the teacher and the students to procure material from various sources on a given subject or topic.

(ii) Make best use of your aesthetic sense to display the material on the bulletin board.

(iii) It is desirable if a brief description about the specific subject or topic is fixed below to title.

(iv) The material displayed should be large enough and should be provided with suitable headings.

(v) Overcrowding of material on bulletin board be avoided.

Advantages of Bulletin Boards

(i) It is a good supplement to class room teaching.

(ii) It helps in arousing the interest of students in a specific subject.

(iii) Such boards can be conveniently used for introducing a topic and for its review as well

4.3.3 AUDIO-VISUAL:

Audio Visual Aids are also called instructional material. Audio literally means "hearing" and "visual" means that which is found by seeing. So all such aids, which endeavor to make the knowledge clear to us through our sense are called "Audio Visual Aids" or Instructional Material. All these learning material make the learning situations as real as possible and give us firsthand knowledge through the organs of hearing and seeing. Therefore, any device which can be used to make the learning experience more concrete and effective, more realistic and dynamic can be considered audio visual material.

Audio-visual aids are used to improve teaching, i.e. to increase the correctness, clarity, and effectiveness of the ideas and skills being transferred. They enable the learner to LOOK, LISTEN, AND LEARN; to learn faster, to learn more, to learn thoroughly and to remember longer. The audio-visual aids help in completing the triangular process of learning, motivation, clarification and stimulation. Audio-visual aids provide significant gains in informational learning, retention, recall, thinking, reasoning, activity, interest, imagination, better assimilation, personal growth and development. The aids are the stimuli for learning 'why', ' how' ' when' 'where'. The difficult and abstract concept can be made clear by the use of skillfully designed teaching aids.

DEFINITIONS:

According to the Webster dictionary, audio-visual aids is defined as *" training or educational material directed at the both the senses of hearing and the sense of sight, films, recordings, photographs, etc. used in classroom instructions, library collections or the likes".*

The Merriam-Webster dictionary defines audio visual aids as *"designed to aid in learning or teaching by making use of both hearing and sight".*

According to Burton – *"Audio visual aids are those sensory objects or images which initiate, stimulate and reinforce learning process".*

Cater V. Good – *"It is a trainable (motivation, classification, and stimulation) process of learning".* **According to Jhut** — *"Audio visual aids are devices that help the teachers to accomplish things quickly and effectively".*

According to Crow & Crow – *"Audio-visual aids gives learners the opportunity to benefit from vicarious experiences with people events, objects, ad cause and effect relationship."*

According to E. C. Daint – *"Audio-visual aids means that complete material, which helps to understand the written or oral subject matter in class room or in other teaching situations".*

NEED & IMPORTANCE OF AUDIO-VISUAL AIDS:

Audio-visual aids are aids used in the teaching-learning process have wide significance from the view points of teachers as well as learners. The importance of audio-visual aids are:

1. **Use of maximum senses** – Senses are said to be gateway of knowledge. Audio-visual aids call for the utilization of as many senses as possible and thereby facilitate the acquisition of maximum learning on the part of the students.
2. **Based on maxims of teaching** – The use of audio-visual aids provide assistance to the teacher for following maxims of teaching like 'simple to complex', 'concrete to abstract' 'and 'known to unknown' and 'learning by doing', etc.
3. **Helpful in the process of attention** – Attention is the key factor in any process of teaching-learning. Audio-visual aids help the teacher in creating proper situations and environment for capturing as well as maintaining the interest and attention of the students in the class room activities.

4. **Save time, money and energy** – Time and energy of both teachers and students may be saved due to audio. The abstract concepts may be easily clarified, understood through their use.
5. **Meet the individual differences requirements** – There are wide individual differences among learners. The use of various types of Audio-visual aids helps in meeting the requirements of different types of pupils.
6. **Solve the problem of indiscipline** – With the introduction of Audio-visual aids, there is less room for the creation of a passive , dull, and uninteresting environment in the class room.
7. **Help in the development of scientific attitude** – Use of Audio-visual aids helps in cultivating scientific attitude among students.
8. **A good motivating force** – Audio-visual aids match the inner urges, instincts, basic drives, and motives of the student and thus prove a potent motivating force for energizing learners to" learn effectively".
9. **Clarity of subject matters** – Audio-visual aids bring clarity to the various difficult, abstract concepts related to subjects.

ADVANTAGES OF AUDIO-VISUAL AIDS:

(i) They create interest for learning in the students.
(ii) They are time saving because they explain the idea easily and precisely.
(iii) By their use the burden of teacher is reduced.
(iv) The teacher can improve his own English by aural aids.
(v) They are the sources of a variety of experiences for students.
(vi) English is a difficult language. Audio-Visual Aids make learning English easy.
(vii) A good English teaching is possible only in a natural English environment. Audio Visual aids help in creating that type of environment.
(viii) They help in concentrating the attention of pupils in learning the lesson.
(ix) The teacher can follow up the principle of from concrete to abstract with the help of audio-visual aids.

4.3.4 COMPUTER:

It's hard to deny that computers have taken a prominent role in modern society. From the smartphones in our pockets to the smart devices controlling our appliances at home and everything in between, computer technology is everywhere. It should

come as no surprise that the use of computers in education has been steadily increasing and in many ways has revolutionized traditional education. Computers in the classroom have multiple benefits for both students and their teachers.

Computers have revolutionized the teaching profession in multiple ways. Teachers use computers to *record grades, calculate averages, manage attendance and access data on student performance in online programs and assessments.* Computers have also made it easier for teachers to vary their instructional delivery.

Purpose of Computers in Education :

Computers are one of the most valuable resources in a classroom because they serve so many useful functions. With computers and the internet, students today have a wealth of information at their fingertips that can help them develop their research and communication skills while preparing them for a future career in a workforce that is increasingly reliant on computer technology.

One of the most common applications of computers in education today involves the ongoing use of educational software and programs that facilitate personalized online instruction for students. Programs like iReady use computers to assess students in reading and math. Students then work on interactive reading and math lessons that are designed to target the specific academic needs identified during diagnostic testing. Educational software like this makes it easier to differentiate instruction so that lessons meet each student's unique learning needs. These tools also provide a wealth of useful data and resources that teachers can use to work with their students in the classroom and maximize learning. Online assessments are more efficient than traditional paper testing because it allows for more immediate feedback and data.

Computers also have an important role beyond primary and secondary education classrooms. Thanks to computers and technological advancements, higher education is now more accessible than ever. Many colleges and universities offer online classes, and some even offer degree programs that can be completed exclusively online. Online classes and online degree programs make it easier for single parents or students with heavy workloads to continue their education from the comfort of their own home and at their own pace.

COMPUTERS IN EDUCATION:

The 1930s saw the development of 'teaching machines' for effective learning. Then followed the use of computers in education. However, there are a number of terms such as computer-assisted learning (CAL), computer assisted instruction (CAI), computer-managed learning (CML), etc., which are used to connote the use of computers in education.

Computer assisted learning (CAL):

In CAL, the learner operates as an autonomous individual and as far as the content of instruction is concerned he/she seeks assistance, or it is given according to his needs. CAL deals with flexible, rapidly changing and detailed information, and is essentially more than a means of administering programmed instructional material, even though the computer connection as a tutor with unlimited patience. Stephen Kemmis et al(1977) advocated four paradigms for CAL. They are:

i) Instructional paradigm,

ii) Revelatory paradigm,

iii) Conjectural paradigm, and

iv) Emancipatory paradigm.

The instructional paradigm' deals with tutorials and drill-and-practice. According to Kemmis, instructional paradigm is based on the assumption that the knowledge and the students' need to acquire it can be specified in language and learnt by the transmission and reception of verbal messages. Thus, under the instructional paradigm, the subject-matter largely determines how it is to be taught.

COMPUTER MANAGED LEARNING (CML):

In CML the learner is more at the receiving end, and much less initiative is expected of him, than in CAL. CML deals with less detailed and less changing information, and has of late been increasingly associated with individualized learning in which the computer makes information stored in it available to the learners in order to provide various learning experiences. These include administering tests for assessing achievement as well as diagnosing the areas of weakness and their follow-up remedial instruction.

A review of literature on CML reveals that a lot more has been written on CAL than on CML. CAI, is more flexible than CML, and it provides greater scope for innovations. Another significant innovation of the 1980s is the computer-based interactive video in education. The interactive video system has three essential components viz., i) the end-user who could be a learner or trainee; ii) the computer system which includes a knowledge elicitation system; and iii) the video disc system. An intelligent interactive video system theoretically performs the interactive function of the human teacher, though the system is still in its infancy.

The description given above of the computer as a medium of education, should not lead you to conclude that the computer (or CAL to be more precise) is equally effective in teaching all subjects. Two important facts have to be kept in mind while

assessing CAL. Firstly, man) Firstly many more studies have been done on CAL in more structured subjects, like mathematics and physics than in the less structured one, like languages and music Secondly almost all these studies have been conducted in the developed countries.

Computer based training (CBT):

The success of the use of the computer in the school and educational set up has resulted in its use for industrial and military training. In fact this is now more predominant and is often referred to as computer-based training (CBT). CBT is an approach to solve performance problems through training, which is essentially individualized. A typical CBT enables the learners to acquire the knowledge and skills that comprise competence in task performance. However, it is similar to CAI in its design. Some call it Technology Based Training (TBT) as well. CBT provides the following advantages:

Tutorial: Activity based tutorials of shorter duration that provide information for understanding and allows higher retention of knowledge.

Drill and Practice: It allows mastery learning through drill and practice.

Learning by closing: CBT can provide complete experiential learning and a learner can develop skills by working on models and simulated projects.

Advantages of Computer in Education:

- Computer helps in storage of information in schools and colleges.
- Quick data processing is possible with the help of computer which plays an important role in education.
- Better presentation of information in schools and colleges is possible using computer to improve education.
- Computer also helps to access Internet to get more knowledge from the world.
- Now a days Quick communication is possible between parents, teachers and students with the help of computer.
- Computer allows students to learn advanced concept easily and effectively.
- Audio - Visual aids. Easy and effective way to gain knowledge with the help of computers.
- With the recent advancement in the education industry, schools and colleges started using computer technology for effective learning.
- Computer also allows teachers to share ideas as well resources online using computer network.

- Online learning is now possible with the help of internet & computer, which improves education in the world.
- Desktop computer can be seen in schools and colleges which helps students and teachers to improve education.
- Computer enhances classroom experiences by incorporating audio visual media.

Disadvantages of Computer in Education:

- Some children spends more and more time in playing computer games which may affect education.
- They also waste their time in watching movies or videos on computer.
- With the excessive use of computer, Students lacks the verbal as well as non verbal skills which is very important for the development of social and emotional skills.
- Sitting in front of a computer for a long time may affect the eyes and health of a student which may indirectly affect education.
- High infrastructure cost, electricity cost and other additional cost may increase by purchasing computer.
- Exposure to inappropriate content is possible on social sites which may have negative impact on students as well as education.

4.4 Overhead Projector, Multi-Media and Smart Classroom

4.4.1 Overhead Projector :

The overhead projector is a very useful adjunct to other teaching aids. It is easy to operate, flexible, and the lecturer can work it himself while facing the audience. Transparencies can be produced quickly and simply, and since they are large enough to be studied without viewing equipment, sets of transparencies can be kept in libraries for the benefit of students revising particular subjects. It is a device meant for projecting a matter written on a transparent plastic sheet on a screen. It makes use of a bulb, lens and mirror placed in an order for projecting the matter.

Overhead Features of Projector :

The overhead projector, although having similar optical elements, represents a lot of improvement over magic lantern, slide, and film projectors. The uniqueness may be summarized as follows:

1. It contains an area of vertical projection besides the straight horizontal path of light available with the usual projectors. The path of the light rays is again changed to a horizontal one by a mirror placed at 45 angle and continues over the shoulder of the teacher to the screen.
2. It contains a large aperture of the size 25 x 25 cm or 20 x 20 cm for placing the slides and other visual materials.
3. It provides for the focusing of the image on the screen by vertical movements of the projection head (containing the objective lens and mirror).
4. There is a provision of a constant flow of air past the lamp by a cooling fan in the base of the projector.
5. Do not put your whole speech on transpersion, just key points and ideas.

Advantages of overhead projector

This equipment as compared to epidiascope and slide-cum-film projector proves to be more valuable in the task of teaching and learning of all the subjects of the school curriculum, as may be revealed through the following discussion:

1. Since the image in this projector is projected over the shoulder of the teacher, he faces the class in usual way at all the times. With the class in full view, it is possible for him to observe the reactions of the students, adjust his responses and actions accordingly, and exercise the desirable control over the teaching-learning situations.
2. The optical system of this type of projector permits placing the projector close the screen and blackboard. Therefore, the teacher can place it even on his table lying in front of the blackboard. He can teach in a usual manner by facing his class and, at the same time, he is capable of operating the machine. There is no need of separate projector operator or the accompanying instructor for the teacher to assist him.
3. Since a high power electric bulb (750 watt or 1000 watt) is used in the projection lamp and not much light is wasted in the projection operation, there is no need of darkening the room for the appropriate visibility of the image on the screen. Consequently, the problems regarding the arrangement for proper variation and cooling of the rooms do not arise.
4. The aperture of this projector is comparatively large. Consequently, it may allow the use of large slides of the size 25 x 25 cm or 20 x 20 cm. The large size of the slides may further facilitate the preparation of art work for slides.
5. Since the slides in this projector are placed on top of the glass aperture, there is no difficulty in changing the slides. Moreover, the teacher may also see the

slides exactly as the students do and thus is able to integrate his comments and teaching with what is being projected on the screen.

6. The main advantage of this projector lies in the fact that the projection screen can be very well utilized by the teacher as a blackboard. He can write or draw at will on the slide or cellophane sheet stretched over the platform with a marking pencil while the object is being projected, without turning away from the class. These marks can be removed afterwards from the slide or the sheet by wiping them with a clean cloth.
7. Usually, the teacher has to go nearer to the blackboard for explaining the things written or sketched on it. However, while making use of this equipment, he does not have to move from machine to the wall to explain things to the students. He can use a pointer or pencil to point out important details of a slide.
8. The projection platform carrying slides can also be used to display a variety of teaching aids. A sheet of transparent plastic or cellophane may be placed on this platform for this purpose. Very useful and relevant drawing and sketches can be drawn on this sheet and the same may be properly projected on the screen. Consequently the practical knowledge regarding the process of election work of the assembly or parliament in session, the organizational structure of an institution or a factory, and demonstration work concerning map drawing can be properly shown on the screen. Not only the graphics, but also the liquid material can be made visible on the screen by placing a transparent disc containing the liquid material on the projection platform.
9. The operational task of this projector also does not involve any difficulty. It simply requires turning of the power switch, placing the slide on the projection platform and focusing the image on the screen.

Disadvantages of the OHP:

1) It is totally dependent on electricity.
2) As compared to a slide projector, it is a little bulky. Hence difficult to shift.
3) Needs accessories like a screen, a stand, an extension board, sockets etc.
4) Since transparencies can be reused, lethargy may set in. Same old transparencies may be used for years.
5) Can serve as a distraction.

4.4.2 MULTI-MEDIA:

Multimedia refers to the computer-assisted integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media in which any type of information can be expressed, stored, communicated, and processed digitally. Multimedia has exploded in popularity in human culture, industry, and education. Multimedia may be applied to almost any type of information we receive, from television to magazines to web sites to movies. Multimedia is a powerful tool for both informing and entertaining the audience. Advertising is perhaps one of the biggest industry's that use multimedia to send their message to the masses. Multimedia in Education has been extremely effective in teaching individuals a wide range of subjects. The human brain learns using many senses such as sight and hearing. While a lecture can be extremely informative, a lecture that integrates pictures or video images can help an individual learn and retain information much more effectively. As technology progresses, so will multimedia. Today, there are plenty of new media technologies being used to create the complete multimedia experience. For instance, virtual reality integrates the sense of touch with video and audio media to immerse an individual into a virtual world. Other media technologies being developed include the sense of smell that can be transmitted via the Internet from one individual to another. Today's video games include bio feedback.

Definition of Multimedia:

By definition Multimedia is a representation of information in an attractive and interactive manner with the use of a combination of text, audio, video, graphics and animation. In other words we can say that Multimedia is a computerized method of presenting information combining textual data, audio, visuals (video), graphics and animations. For examples: E-Mail, Yahoo Messenger, Video Conferencing, and Multimedia Message Service (MMS).

Multimedia as name suggests is the combination of Multi and Media that is many types of media (hardware/software) used for communication of information.

Multimedia can arguably be distinguished from traditional motion pictures or movies both by the scale of the production (multimedia is usually smaller and less expensive) and by the possibility of audience interactivity or involvement (in which case, it is usually called *interactive multimedia*). Interactive elements can include: voice command, mouse manipulation, text entry, touch screen, video capture of the user, or live participation (in live presentations).

Components of Multimedia:

Following are the common components of multimedia:

- **Text-** All multimedia productions contain some amount of text. The text can have various types of fonts and sizes to suit the profession presentation of the multimedia software.
- **Graphics-** Graphics make the multimedia application attractive. In many cases people do not like reading large amount of textual matter on the screen. Therefore, graphics are used more often than text to explain a concept, present background information etc. There are two types of Graphics:
  - **Bitmap images-** Bitmap images are real images that can be captured from devices such as digital cameras or scanners. Generally bitmap images are not editable. Bitmap images require a large amount of memory.
  - **Vector Graphics-** Vector graphics are drawn on the computer and only require a small amount of memory. These graphics are editable.
- **Audio-** A multimedia application may require the use of speech, music and sound effects. These are called audio or sound element of multimedia.Speech is also a perfect way for teaching. Audio are of analog and digital types. Analog audio or sound refers to the original sound signal. Computer stores the sound in digital form. Therefore, the sound used in multimedia application is digital audio.
- **Video-** The term video refers to the moving picture, accompanied by sound such as a picture in television. Video element of multimedia application gives a lot of information in small duration of time. Digital video is useful in multimedia application for showing real life objects. Video have highest performance demand on the computer memory and on the bandwidth if placed on the internet. Digital video files can be stored like any other files in the computer and the quality of the video can still be maintained. The digital video files can be transferred within a computer network. The digital video clips can be edited easily.
- **Animation-** Animation is a process of making a static image look like it is moving. An animation is just a continuous series of still images that are displayed in a sequence. The animation can be used effectively for attracting attention. Animation also makes a presentation light and attractive. Animation is very popular in multimedia application

Applications of Multimedia:

Following are the common areas of applications of multimedia.

- **Multimedia in Business-** Multimedia can be used in many applications in a business. The multimedia technology along with communication technology has opened the door for information of global wok groups. Today the team members may be working anywhere and can work for various companies. Thus the work place will become global. The multimedia network should support the following facilities:
  - Voice Mail
  - Electronic Mail
  - Multimedia based FAX
  - Office Needs
  - Employee Training
  - Sales and Other types of Group Presentation
  - Records Management
- **Multimedia in Marketing and Advertising-** By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.
- **Multimedia in Entertainment-** By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.
- **Multimedia in Education-** Many computer games with focus on education are now available. Consider an example of an educational game which plays various rhymes for kids. The child can paint the pictures, increase reduce size of various objects etc apart from just playing the rhymes.Several other multimedia packages are available in the market which provide a lot of detailed information and playing capabilities to kids.

- **Multimedia in Bank-** Bank is another public place where multimedia is finding more and more application in recent times. People go to bank to open saving/current accounts, deposit funds, withdraw money, know various financial schemes of the bank, obtain loans etc. Every bank has a lot of information which it wants to impart to in customers. For this purpose, it can use multimedia in many ways. Bank also displays information about its various schemes on a PC monitor placed in the rest area for customers. Today on-line and internet banking have become very popular. These use multimedia extensively. Multimedia is thus helping banks give service to their customers and also in educating them about banks attractive finance schemes.
- **Multimedia in Hospital-** Multimedia best use in hospitals is for real time monitoring of conditions of patients in critical illness or accident. The conditions are displayed continuously on a computer screen and can alert the doctor/ nurse on duty if any changes are observed on the screen. Multimedia makes it possible to consult a surgeon or an expert who can watch an ongoing surgery line on his PC monitor and give online advice at any crucial juncture.

  In hospitals multimedia can also be used to diagnose an illness with CD-ROMs/ Cassettes/ DVDs full of multimedia based information about various diseases and their treatment.Some

  hospitals extensively use multimedia presentations in training their junior staff of doctors and nurses. Multimedia displays are now extensively used during critical surgeries.
- **Multimedia Pedagogues-** Pedagogues are useful teaching aids only if they stimulate and motivate the students. The audio-visual support to a pedagogue can actually help in doing so. A multimedia tutor can provide multiple numbers of challenges to the student to stimulate his interest in a topic. The instruction provided by pedagogue have moved beyond providing only button level control to intelligent simulations, dynamic creation of links, composition and collaboration and system testing of the user interactions.
- **Communication Technology and Multimedia Services-** The advancement of high computing abilities, communication ways and relevant standards has started the beginning of an era where you will be provided with multimedia facilities at home. These services may include:
  - Basic Television Services
  - Interactive entertainment

- Digital Audio
- Video on demand
- Home shopping
- Financial Transactions
- Interactive multiplayer or single player games
- Digital multimedia libraries
- E-Newspapers, e-magazines

Advantages and Limitations of Using Multimedia in Education:

Multimedia in the classroom has evolved rapidly with a progression from audio cassettes to internet sites in classroom learning. Examples of multimedia in the classroom include the use of video, the creation of video by students, the creation of spreadsheets or the development of a website displaying student work. Multimedia has many advantages, some of which are listed below.

Very effective for learning:

Multimedia is a very effective way to learn. It helps students retain the information they have learned. Media can also be used to create visuals for learning tools such as PowerPoint presentations, websites, and blogs.

More appealing over traditional work:

The use of multimedia is so powerful and versatile that it can be very effective in educating a group, company or individual. While traditional lectures have a limited time span, multimedia can have an unlimited time frame. This is why many companies invest in promoting video training to keep the attention of their employees for long periods of time.

Improves personal Communication:

Multimedia is a powerful tool that enhances personal communication. It allows for better storytelling and gives people more control over the story. Creating multimedia content is a great way to engage with your audience and tell your story in a way they can relate to.

Saves time and costs:

It is important to note that multimedia learning engages more senses than other forms of training. It is ideal for people with busy lives because they can access the

information on their own time rather than having to take a class. This reduces the costs that would typically be associated with traditional training methods.

Multimedia can be a great way to reach out to your audience:

They allow you to provide high quality information while reaching different demographics and making it much easier for people to share your content online. The Internet is an incredibly important market, and with the multimedia trend continuing to grow, it is wise to invest or incorporate this into every business.

Multimedia compliments user interface:

Multimedia includes text, audio, or visual elements that communicate information to the user. These can include images, videos, games, and animations. They can be embedded in a website or blog post or provided as standalone items. It is important for users to have multimedia available to them because they allow them to engage with their content in a more impactful way by providing a bridge between their thoughts and the rest of the Internet.

Multimedia is Multi Sensorial:

Multimedia can take advantage of different senses, such as sight, sound, touch and even smell (4D-cinemas etc). Targeting these senses together can increase appeal to any audience.

Integrated and Interactive:

Multimedia can be integrated into existing marketing activities to create a more interactive, engaging process. This helps the customer feel more a part of the process and builds stronger relationships between company and consumer. For example, content might be shared on YouTube while promoting a product on Instagram or Facebook.

Highly flexible:

Multimedia allows for flexibility in business plans. With multimedia, you can communicate with your audience in a way that is meant to be understood regardless of the location. It provides a wide range of opportunities for planning and marketing.

■ Disadvantages of Multimedia

Multimedia presents a host of challenges – from limited storage space to the time needed to produce multimedia content, hence, this technology might not be for everyone. Other disadvantages of multimedia are as follows:

Information overload:

One of the biggest problems with multimedia is information overload. The more time a person spends on the internet, the more likely they are to feel overwhelmed by all the information available. Additionally, research has shown that people are less productive when using multiple media at a time.

Misuse of Multimedia:

Multimedia can be a useful tool in education, marketing, and many other aspects of life. However, there are several disadvantages to the use of multimedia. For example, it is distracting because many people like to watch videos while they are doing anything else, such as working or driving. This distracts people from what they should be focusing on. Multimedia also consumes a lot of time and resources that could be used for other activities.

Limited interaction:

The disadvantage of multimedia is that it's hard for users to interact with their content. People have limited ways in which they can engage with the text, images and sounds on a website. It doesn't give them the same experience that they would get from visiting a physical store.

Consumes a lot of time:

Multimedia is a resource that can be used to create many different types of content. However, there are some drawbacks to using this technology. One major downside is that multimedia consumes a lot of

time. People may spend hours on their phone or computer while they could have been doing other things like exercising or spending time with friends and family.

Dependent on marketing:

Multimedia can be a great tool, but it does come with some disadvantages. Multimedia is typically expensive because of the resources required for development. When new multimedia platforms are released, most people buy into them because of the marketing that's done. In cases where the marketing fails, multimedia becomes essentially useless.

Resource intensive:

Multimedia is a resource intensive format. As a medium, it takes up space on your computer and can consume a lot of power. This adds to the overall cost for

multimedia. It's also difficult to give multimedia content the proper attention that it deserves when it's being consumed across multiple devices and platforms

Requires huge investments:

Multimedia requires a significant investment. You will need to hire artists, singers, videographers, and other individuals with unique talents.

■ **Implication of Multimedia in teaching learning :**

The revolution in the information and communication technology arena has produced a techno savvy and media-hungry generation, which uses digital media as a way to learn and share with each other. It is affecting communication strategies in education environment and influencing the ways teachers teach and students learn. Multimedia or the use of multiple digital media elements in an interactive learning application is becoming an emerging trend in the communication of educational information. Multimedia offers an excellent alternative to traditional teaching by allowing the students to explore and learn at different paces where every student has the opportunity to learn at his or her own potential. People enjoy multimedia and they prefer multimedia learning materials because the multiple media help them to learn. Many educators now consider multimedia as a burning topic in education, because it represents the topic through various media elements and introduces new ways of thinking in the classroom. Studies have shown that multimedia based instruction increases effectiveness at least 30% more than the traditional or any other form of instruction.

Multimedia with its capability to present information using multiple media is being increasingly used worldwide in e-learning. E-learning is the use of new multimedia technologies and the internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration. Multimedia is used in distance learning through stored presentations, live teaching, and participation by the students.

In India, multimedia is used in different ways for teaching and learning L.e. e-learning, distance learning, virtual learning etc. The Virtual Lab Project is a multimedia based e-learning program for technical education for technical training centres and engineering colleges in West Bengal in India (Chaudhury, Bhattacharyya & Akuli, 2003). EDUSAT (Education Satellite) is launched by India for serving the educational sector of the country for emulating virtual classroom in an effective manner. It is specially configured for the audiovisual medium, employing digital interactive classroom and multimedia multi-centric systems. Consortium for Educational

Communication (CEC), an autonomous body of University Grants Commission (UGC) has started regular transmission through EDUSAT from 2005 (Behera, n.d.). UGC has established Educational Multimedia Resource Centres (EMMRCS) in different parts of the country for the production of multimedia resources for educational purpose.

The University Grants Commission (UGC), Indira Gandhi National Open University (IGNOU) and several state institutions of education continued to broadcast educational programs through national and regional channels of Doordarshan. The Ministry of Human Resources Development (MHRD) together with UGC had initiated setting up of four satellite television channels for educational purpose named as Gyan Darshan 1, 2, 3 and 4. An FM Radio channel named as Gyan Vahini operating through FM stations from various parts of the country was initiated in 2001, now having more than 40 stations. Each Gyan Vahini station operate as media cooperatives, with multimedia products produced by various ministries, educational institutions, autonomous bodies, national level institutions such as UGC, NCERT, IGNOU, IITS and open universities. IGNOU has developed many multimedia programs for teaching various subjects like chemistry, language, biology etc. to its students.

4.4.3 Smart Classroom:

Concept of Smart Classroom:

The traditional approach of lecture and note taking has lost its effectiveness as the modern day around education grows. In efforts to grow academically it must be considered that differentiated modalities of teaching and learning are necessary to implement deeper levels of growth and conceptual development. Since every student is not interested in all subject matters. However, it is the responsibility of the education system to employ a variety of opportunities for the students to gain interests, orchestrating academic growth and progression throughout childhood and adolescence. ICT has turned from being a technology of communication and information to a curriculum creation and delivery system for teachers and learners. The Smart Learning approach provides learners of all ages and walks of life with a framework and a host of Smart Thinking Tools that motivate higher levels of understanding. Through the process learners activate and build background knowledge, process information, transform their learning into a product that shows what they know, and reflect on their learning. Structured talk and assessment as and for learning are carefully woven into the process to build a thoughtful context for learning and to advance the thinking of all learners. Smart Learning realizes the goals of inclusivity and differentiation.

"Smart school and smart class" is an innovative concept in education. Now a day's we are living in the age of internet, so our education system is also going to be online. In this environment e learning and online education is the need of this time. Use of internet in schools and education is not only a dream, but it is the necessity of the time.

In a smart class there will be computers, projectors, internet connectivity and other multimedia devices such as home theater etc. The role of a teacher may be modified in such new environment. In a smart class students may use internet and this activity can change the old thinking about the students and the learning theory. In beginning, it should be launched as a pilot project in a few schools. The experience and result of these schools leads the future planning.

Characteristics of a smart classrooms:

Adaptive learning:

Any classroom will always have students of different types of learning abilities in it which often makes it difficult for teachers to make sure that all of them understand the concepts. The modern approach of adaptive learning gives students the freedom to learn at their own pace and in the way they are most comfortable with.

Collaborative learning:

Learning through collaboration is one of the most effective forms of learning. Teaching and learning in isolation are very restrictive and hinder progress. Learning in groups enhances the scope of learning and develops critical thinking. Collaborative learning activities include collaborative writing, group projects, joint problem solving, debates and more. Collaborative learning redefines traditional student-teacher relationship in the classroom.

Computing devices:

Computers are readily available in modern classrooms, since they are essential tools for 21st century students and replace the utilities of pen and paper. They give teachers the opportunity to enhance their lessons and assist them.

Mutual respect:

Teachers and students should always have respect for each other. As now the role of teachers is no longer to be the sage on the stage, students should not forget their value as they will always receive guidance from them. Also, teachers should encourage students to speak with confidence and value their opinions.

Performance-based assessments:

Regular performance-based assessments are carried out by teachers through various methods which are not restricted to tests. These can be by conducting quizzes and polls.

Student-centric:

In Smart classrooms, teachers play the role of facilitators. They help students think critically. Students discover and master new concepts. Student-centric classroom environments put students' interests first and are focused on each student's needs, abilities and learning styles.

Students take responsibility of their learning:

As students are encouraged to actively participate in their own learning, they become responsible for their learning.

Students understand and follow the rules and procedures:

The learning environment is carefully planned and well-organized. Class rules, procedures, and notices of upcoming activities are posted in convenient places to help students stay on track. Students are constantly encouraged to remind them of their goals and responsibilities. They follow class routines and understand what they are expected to achieve each day and how they are to go about it.

There is innovative working system for teachers and in management:

An attractive classroom environment is needed for such type smart and innovative activities. Smart class will be more attractive, innovative, student friendly, healthy and more interesting class. In a smart class it may possible there to arrange "online classes" by internet. Smart class is a platform for e smart class and online IT class.

There is fully multimedia enabled audio-visual classrooms:

Smart Class is a Smart concept for Smart Educators of Smart Schools. "Smart Class" includes Smart Learning Techniques, Smart classroom management, Smart Learning environment and Smart Learning Materials. Internet, projector and other multimedia devices are the main parts of smart classrooms. Smart class is a class of modern age. There is fully multimedia enabled audio-visual classrooms in a smart classroom. It will be quite different than traditional class. In a smart classroom the teacher works as a facilitator in learning.

Objective of Smart Class Room

The following are some objectives for a Smart Class Room application:

A. To help teachers to meet new challenges and developing students' abilities and performance.

B. To enables teachers to access multimedia content and information that can be used for teaching students more effectively. Pedagogically sound and visually rich curriculum resources.

C. To enables teachers to express their views and ensures that every child is understanding the undertaken concept which ultimately affects his achievement.

D. To make possible for the concepts to be understood clearly. To makes abstract concept real.

E. To have interactive and live teaching to elaborate and compare different objects and perceptions towards the particular concepts.

F. To designed a module of smart class which allows a student to visualize the concept much better than static images. Visuals and animations that students will never forget.

G. To move a step towards development where students' achievement is highlighted.

H. To makes learning an enjoyable experience for students. Activities and games to make learning process easy.

I. To make effective blending of technology with the classroom, and to Inform the teachers of classroom events

J. To instruct simultaneously remote and local students.

K. To improve creative thinking in learning process to visualize the concepts and practices with model and demonstrations.

L. To optimize the use of e-resources wise e-books, e-journals, protocols, lecture notes, documentaries and so on.

M. To customized content as per the school's scheme of work and to provide facility to update the content.

Types of Smart Classroom:

1) **Basic Smart Classes:** The classrooms with basic smart technology include gadgets like laptops or computers, projector, DVD or VCD player and a viewing screen etc.

2) **Intermediate Smart Classes:** The intermediate smart classrooms are one step ahead of the basic technology smart classrooms. They include gadgets like a smart podium with the control panel in addition to a laptop, projector, screen and DVD or VCD player etc.

3) **Advanced Smart Classes:** The advanced smart classrooms have all the gadgets of a basic or intermediate smart classroom but their features are very advanced, that is, they use the newest technology.

Principles of smart classroom :

The following are the principles for smart classrooms in terms of arrangement and pedagogical configuration which we have established as widely generalizable and which should be considered in order to transform any formal learning space in smart classroom.

Principle of Adaptability:

From the idea that every teacher and every class is different, and that space can be adapted to their needs, the concept of smart classrooms includes the principle of adaptability to the type and needs of teacher and of each student.

Principle of Connectivity:

The concept of connectivity has a twofold character. On one hand it is required that the learning space has a good network connectivity, both local and global, to use to the most the potential of mobile devices. Connectivity should be wireless, and this is fundamental to maximize physical mobility around the space and comfort in using technology. On the other hand, beyond digital connectivity there exists social and informational connectivity. Through networks, students live connected to teachers, friends, family, professionals and to a large number of information sources, both in their immediate surrounding and from distant places.

Principle of Comfort:

Under this principle, elements which enable this well-being should be included in the learning space for the various tasks to be done for learning, such as couches, pillows, rugs and carpets, comfortable chairs. A smart classroom is a place arranged to comfortably do various activities –reading, watching videos, playing, listening to music and audios, writing, talking, debating, experimentation, and so on.

Principle of Flexibility of physical arrangement:

The arrangement of a smart classroom and its elements is such that it allows agile and easy variations in activities, that is, make it possible to change student grouping, the type of resources being used, use of various types of resources at the same time, ICT and non-ICT, for different students to carry out different tasks, e.g. searching information, discussing, watching a video, etc. The classrooms is supplied with varied furniture elements to achieve flexibility of space arrangement.

Principle of Multiplicity:

This principle refers to smart classrooms having features which enable the use of various types of resources and stimuli. While teaching and learning, the arrangement enable possibilities for creativity, reasoning, logical thinking, etc., and be adapted as close as possible to learners' various needs and learning styles.

Principle of Order / Organization:

This is an important principle, even though it is not easy to design, and attain, sustainable placing, storing, arrangement and rules of use of spaces and resources available. For this reason teachers carefully consider the order and arrangement of spaces and resources so that these are the most adequate for the learning activities that will take place in their smart classroom.

Principle of Openness:

This principle relates to the false and rooted belief that learning takes place only in the formal space in the traditional classroom, where the teacher presents information and gives a lesson in a transmissive way. Learning takes place beyond the classroom space, both physically and virtually, and therefore activities put forward for smart classrooms should consider these extended learning places and learning times in order to learn beyond the classroom and the class times traditionally assigned.

Principle of Personalization:

Smart classrooms allows students and teachers to personalize their environment according to their likes and needs. A space which progressively teacher and students should make their own, personalizing it by means of activities which support and reinforce learning.

Principle of Safety / Security:

Smart classrooms have an arrangement which prevents users from having physical accidents and will also be safe in terms of access to information and communication

on the Internet from the classroom. Therefore security systems will be taken into account when conceptualizing and designing smart classrooms.

In sum, the arrangement, structure, methodologies and principles of smart classrooms intend that learning experience be as likely as people's learning ways, preferences and styles, in a natural way and in a personal space; all this through active participation, experimentation, collaboration, solidarity, rapport, creativity, leadership, and so on.

COMPONENTS OF SMART CLASS ROOM:

- Smart Board (6X4)
- Smart LED TV High (Panasonic 42", 2 USB, Viera connect)
- Short throw Projector (Panasonic PT-VX400)
- Video Conferencing Equipments
- Laptop with Internet connection (with public IP)
- Document Camera/ Visulaizer (12 time optical Zoom and 8 time Digital Zoom)
- Podium (ITC 6236B, 60W amplifier inbulit)
- Video Conferencing – High Definition (Lifesize Express 220) and Screen
- Architecture of Smart Classroom at Library

AFFORDABLE COMPONENTS OF TECHNOLOGY FOR SMART CLASS ROOM:

With so much new education technology being created at such a rapid pace, teachers can have a hard time deciding what will be beneficial in their classrooms. Even after a specific device or program has been chosen, cost can often be prohibitive in a school environment, making it difficult for smaller districts to access the same advantages of larger ones. To help sort through all of the noise and find the best tools at the lowest price, we look into four of the most budget-friendly pieces of technology that can benefit classrooms:

Document Cameras:

A budget-friendly device that can help to more actively engage students, document cameras allow teachers to display worksheets on a screen or to individual devices much like an old-school lamination projector. Group exercises and quizzes can be displayed with the camera instead of on individual sheets of paper, helping classrooms become more environmentally friendly as well as technologically savvy.

SMART Boards:

Interactive whiteboards, or SMART boards, offer a benefit similar to that of a document camera, but taken up a notch. Presentations are made more robust and given more depth. When a picture or document is displayed on the board, teachers can write on them with an Internet-connected stylus that provides a

trove of additional information to the lesson, such as definitions, extra images or accompanying video. Instructors are also able to archive and share any lesson that has used the board, and past lessons can be revisited to reinforce new topics being covered.

Cloud-based Communication Systems:

One of the most beneficial aspects of adding technology into a classroom environment is its ability to broaden the scope of what students are exposed to on a daily basis. With Internet communication services like voice-over-IP and Web conferencing, teachers can arrange for virtual field trips to places they wouldn't be able to take their classes otherwise. Experts in specific topics can give a talk through Skype and students can collaborate with one another on projects online.

4) Tablets and eBooks :

Like laptops and smartphones, tablets and e-readers are becoming increasingly popular with students outside of school. Harnessing familiar technology inside the classroom can help to engage students and help them feel more comfortable with the material since it is being presented in a format they are used to. Providing electronic copies of textbooks also allows students to go into the lesson more in depth, as links to additional material can be provided inside the text. Key concept summaries can also be provided at the end of a section, as well as digital flashcards that cover the lesson plan.

All of these devices can help teachers and schools greatly improve learning experiences for their students, but all of the benefits offered by the technology would be for nothing if it can't be managed effectively and kept secure.

Advantages and disadvantages of smart classroom

Bringing technology in classrooms has been a topic of debate for the last couple of decades. While many parents, teachers, academicians and policy makers are in favour of the same, others think it is a total disaster. Let's look into the matter and discuss some of the positives and negatives of bringing technology inside classrooms.

ADVANTAGES:

Access to online information:

Technology tools allow learners to easily access a rich database of online resources. Teachers can use the wide variety of online information sources such as knowledge databases, online video and news items to reinforce their lessons. Learners can also quickly access the wide range of powerful tools and resources to conduct.

Allow for connectivity in different location:

Interactive technology tools allow for connectivity in different locations; making ideal collaboration and distance learning environments. When using technology tools, student show to increase student-to-student collaboration and increase overall participation in the lesson.

Better understanding:

It shifts the classroom experience from the sage-on-a-stage approach to a more collaborative environment. With classrooms turning into smart classrooms, students are also getting smarter! Big chunks of paragraphs are being replaced with pie charts, bar graphs and images and the theory "A picture is worth a thousand words" is coming to life.

Bridge the urban/rural divide:

The smart classroom creates another opportunity to bridge the urban/rural divide by exposing students to technology in a classroom setting. Also, this classroom may be used in conjunction with our proposal for pre college outreach to allow children and teenagers to experience technology that they may not otherwise be exposed to in a rural, small town setting.

Countless resources for making learning more fun and effective:

From apps to organizational platforms to e-textbooks and more, there are many amazing tools that can help .Tools will help both students and professors alike collaborate, share ideas, stay organized, and more to get the most out of learning.

Makes Learning Enjoyable:

If we go and look in a regular classroom, the students are feeling very sleepy. Some of the students are not even listening to the teacher. They are busy talking with their friends. In short, the class becomes very boring for them. But it is not so in a smart classroom. The use of smart technology in the class makes the classroom a fun

room. The class becomes interesting and enjoyable for the students. No student feels sleepy. It makes learning a fun process. The students who do not like to go to schools also start enjoying the school.

Improves the Academic Performance:

It is often seen that the students studying in a smart class get a better result than the students studying in a regular class. This is so because the understanding ability in the students studying in a smart classroom is way more than other students. The use of technology in the classroom for teaching increases the understanding of the students. The topic becomes clear and the base of the subject becomes stronger. Obviously, the students with a better hold of the subject and with strong basic knowledge of the subject will score more in exams.

Environmentally friendly:

Interactive technology tools are also environmentally friendly. They offer teachers an entirely different way of presenting information to students, which eliminates the need for writing, printing or photocopying. Which, contribute to eliminate wastage from over-utilization of paper and ink.

Enhanced teaching/learning experience:

Technology tools provide new ways for teachers to teach, and for student to learn. These tools support a wide variety of learning styles. For instance, visual learners can watch as their tutors use the technology tools to project visual elements, whereas audio learners can listen and have discussions. On the other hand, the Boards come with touch screen capabilities that allow tactile learners to touch and interact with the board.

Increased exposure and wider access to information:

With internet access, students are provided with great exposure as they are given a chance to think and feel outside their bubble. They come in terms with what is happening in the world and perhaps even try to change the wrong. Technology nowadays is not only widely available but also affordable. From apps to e-textbooks to Wikipedia, no matter how far you go, all you need is the internet and information will be available to you and all other potential readers and learners.

Improved student engagement:

Students who hardly raise their hands in class or the back benchers who are usually sleeping, now look forward to learning something new as these modern age

tools are more relatable to them. By fostering discussions and surfacing new and out of the box ideas, technology also helps improve the student- teacher bond.

Interact and share:

The interactive nature of technology tools offers learners an opportunity to share and participate in the instructional process. Interactivity provides a platform for students to demonstrate their grasp of the subject through touching, drawing, and writing. Every learner has an opportunity to participate or contribute to the presentation and discussion.

Low-Maintenance:

Technology tools are neat and easy to use. There are no hassles cleaning or maintaining whiteboards. The data on the screen can be modified using a specialized highlighting tool or pen. There is no need for using unhygienic chalk or marker pens.

Provide rapid assessment:

In addition, the technology tools provide for rapid assessment whereby learners can receive immediate feedback. Teachers and students are able to identify individual strengths and weaknesses in various subject areas and isolate areas/topics that need more focus or review. Thus smart board helps to increase the involvement of the students in learning.

Provides Flexibility:

Interactive technology tools allow many different forms of media – including photos, illustrations, maps, graphs, games, and video, to be displayed. These tools help to expand the nature of content that can be used in learning. In addition, technology tools makes learning to be more dynamic as the different forms of presenting information are readily available.

Students can learn life skills through technology:

Creating presentations, learning to differentiate reliable from unreliable sources on the Internet, maintaining proper online etiquette, and writing emails; these are all vital skills that your students can learn in the classroom and master before graduation.

Technology Integration:

Technology tools allows for integration of various technologies in order to improve the learning experience. For instance, it is possible to attach tools such as microscopes, document cameras, cameras or video cameras to a whiteboard to aid in instruction.

It is also possible to integrate the interactive learning tools with a wide range of software applications.

Teachers can do more experiment in pedagogy:

As an academic professional, teaches learn more about how to effectively design and execute a class guided with technology. Whether it's a dramatic change such as teaching with a flipped-classroom, or just adopting a single tool for a specific project or term, he will learn something new in modern academia!

Being well-versed in technology can also help build his credibility with students, and even with fellow colleagues.

DISADVANTAGES:

Disconnected Youth

This harmful effect of technology has already come to light in today's world. People are attached to their screens almost 24/7, which is causing an entirely new set of social issues to pop up. This translates into the school system in a bit of a different way, however. More and more students are experiencing social anxieties when it comes to face to face interactions, but are perfectly fine socializing online.

Can foster more cheating in class and on assignments:

This will happen if the teacher give up hope on adjusting his students' attitudes and only give them subjective assignments that require no thought or perspective.

Inevitable Cheating:

While have an easy access to information may seem like a great thing, it can become a real problem in a test taking environment. Cell phones have made cheating easier than ever. You no longer have to figure out how to write all of the answers down, you can just look them up!

Inappropriate data:

With internet connectivity available 24X7, students are exposed to some sites and links which are inappropriate for them. While colleges can limit the availability of these websites on their network, they cannot control what the student is searching for.t is a bit of expensive job to set up the smart classroom environment. The biggest concern when it comes to the use of technology in schools is how easy pornographic, violent, and other inappropriate materials can be accessed and viewed. This could cause big problems if the material is shared with other students while in the classroom.

Lack of face to face interaction:

With social media platforms, students might have come closer to each other by using various apps and sites but, at the same time, they have gone far from each other when it comes to face to face interaction which is apparently affecting their real life social skills.

Lesson planning can become more labor intensive:

It can seem overwhelming to adapt technology into the classroom. In many ways though, using technology can become as natural to as any daily activity. Allow time to learn how to use something.

Chances are that students will learn it even faster than you since they've grown up surrounded by technology.

Possible disconnection of social interaction:

Many people are skeptical of technology and what it does to students' ability to verbally communicate. If the teacher create assignments in class that use both technological tools as well as oral presentations and collaboration, this will teach students to be dynamic in how they learn and interact with others.

Students do not have equal access to technological resources:

There may be students who do not have iPads or cameras or even the textbooks for class. It will be up to the teacher to point them in the direction of the library or community resources, or to create assignments that allow them to work in groups and share resources.

The Cyberbullying Trap:

Giving students access to anonymous accounts and endless contact avenues can only lead to trouble. Cyber bullying has become a real and in our face problem among young people today. This harassment has no end, which includes the class room. There is also no way to monitor or discipline students who are involved.

Technology can be a distraction:

One of the major drawbacks of having technology in classrooms is the distraction which comes complimentary with it. With so many tempting social media platforms like snap chat, Instagram, facebook, twitter and tumblr, it's not hard for the students to divert from what is happening in the class and misuse the opportunity given to them. Attentiveness drops drastically in the classroom when students have their cell

phones or other technologies out. The focus shifts from their teacher and education, to whatever they are looking at, playing, or doing on their phones.

The quality of sources may not be top-notch:

The internet is both a blessing and a curse. The students may need some guidance on identifying proper sources and unreliable sources. Many campuses have writing centers that can help with this. However, the need of the hour is setting up of guidelines and rules in place, teaching students about online safety and helping them understand what the good sources of information are. Apart from that, trying to restrain personal usage of internet to as less as possible in the classrooms should also be taken care of.

4.5.1 INFORMATION AND COMMUNICATION TECHNOLOGY (ICT):

The term ICT is also used to refer to the convergence of audiovisual and telephone networks with computer networks through a single link system. There are large economic incentives to merge the telephone network with the computer network system using a single unified system of cabling, signal distribution, and management. communication device, encompassing radio, television, cell phones, computer and network hardware, satellite systems and so on, as well as the various services and appliance with them such as video conferencing and distance learning. Information Communication Technology is a common term referring to the technologies used for collecting, storing, editing and communicating information .ICT means the use of computer-based technology and the Internet to make information and communication services available in a wide range of users. ICT Is a Hardware and Software that enable society to create, collect, consolidate and communicate information in a multimedia format and for various purposes. The term ICT includes any communication device or application, encompassing, radio, TV, cellular phones, computers and network, hardware and software, satellite systems and so on, as well as the various services and application associated with them. ICT is playing a vital role in the current and future development of society and nation. ICT has affected all spheres of life and also the library. Information and communication technology is a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information. Information and communications technology (ICT) refers to all the technology used to handle telecommunications, broadcast media,

intelligent building management systems, audiovisual processing and transmission systems, and network-based control and monitoring functions.

DEFINITION OF ICT:

According to the Encyclopedia of Computer Science, *"Information Communication Technology (ICT) is an imprecise term frequently fundamental to broad areas of technologies and associated with the use of computers and communications".*

According to UNESCO *"ICT is a scientific, technological and engineering discipline and management techniques used in handling information and application and social, economical and cultural matters".*

Types of ICT users

The term "user" is the one that defines individuals who keep in touch with Information and Communication Technologies. Now, just like these technologies, users can be classified according to their level of experience in the field. In such way, we have the following:

A. **Advanced user:** this is a person who has digital skills worked on and is very familiar with the use of Information and Communication Technologies.

B. **Programmer:** "programmer" is defined as the user who has the ability to program computers professionally.

C. **Systems analyst:** a systems analyst or applications analyst is a user who, in addition to having the ability to program computers professionally, has the ability to create programs and applications in the field of computing, as well as to develop systems of complex information.

D. **Digital illiterate:** corresponds to all those people who do not have any contact with this type of technology.

Examples of ICT

A. Television

B. Radio

C. The landline and mobile phone

D. MP3 players

E. Memory cards

F. Portable digital versatile discs (DVD)

G. Global positioning system (GPS) devices

H. Computers: these have generated the greatest impact, mainly due to the advantage of allowing us to access the internet, a global communications network that has facilitated access to information provided by any server worldwide, also favoring interaction between people located in different physical spaces.

NEED OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT):

Source of information: Information and communication technology (ICT) covers most of the mass media such as newspapers, television, satellite, internet, etc. Thus there is a vast ocean of knowledge and information available waiting to be tapped and disseminated.

Balanced development in rural and urban areas: There is a strong need to remove social and economic heterogeneity in society especially in a highly populous country like ours where nearly 70% of our population lives in villages. True progress of our nation can only take place when the rural areas are also equally involved and upgraded with modern technology.

Distance education: More and more people are opting for distance education for several reasons-earn and leam, part-time education or just for gaining more knowledge. Thus with Information and communication technology (ICT) the best of education can be received sitting in any remote corner.

Online or e-learning: E-learning is the new mantra where anything and everything is available on the World Wide Web. But to avoid overloading of information, one needs to use Information and communication technology (ICT) for the proper organization and distribution of this knowledge.

Conferencing: Time is money and the jet-setting executives and professionals need to constantly stay in touch and updated. With the help of ICT, people can stay in touch personally and in real-time.

Exchange of views and ideas: Man is a social animal. He constantly needs to interact with other people of his kind and ICT greatly facilitates this process.

Shrinking the globe: Due to globalization and hug influx of mass media, the world has become a small place and it is needed to know about all the peoples of the world for better social understanding and development. Here also the Information and communication technology (ICT) can play a key role.

ADVANTAGES OF ICT:

Globalization : Video conferencing saves money on flights and accommodation. ICT has not only brought the countries and people closer together, but it has allowed the worlds economy to be become a single interdependent system to contact either a business to make them exceptionally cost effective.

Cost effectiveness: The feels free to send an email and without doubt cheaper than phone calls. ICT has also helped to automate business practices, to make them exceptionally cost effective.

More Time : You may have your goods delivered right to your doorstep with having to move a single muscle by clicking the items to be purchased via internet and making payment electronically.

Creation of new jobs: The best advantage of ICT has been the creation of new activate and interesting job. Computer programmers, system, hardware, and software developers and web designers are some of the many new employment opportunities created with the help of IT.

Education : Computer's along with their programs and the internet have created educational opportunities not available to previous generations. A degree can be completed online from person's home. it is possible to hold a job and still do degree.

DISADVANTAGES OF ICT :

Blackmail: Using the internet to threaten to cause damage with the intent to extort from any person any money or other thing of value.

Unemployment: Using the computer instead of human resources employers are save huge amount of money but employees are losing their jobs as not needed anymore.

Privacy: Information technology may have made communication fast and more convenient, it has also brought along privacy problem. From cell phone signal interception to email hacking, about their once private information becoming public knowledge.

Computer virus: Worms, Trojan, malware, spam any or all can chaos and disrupt our daily lives.

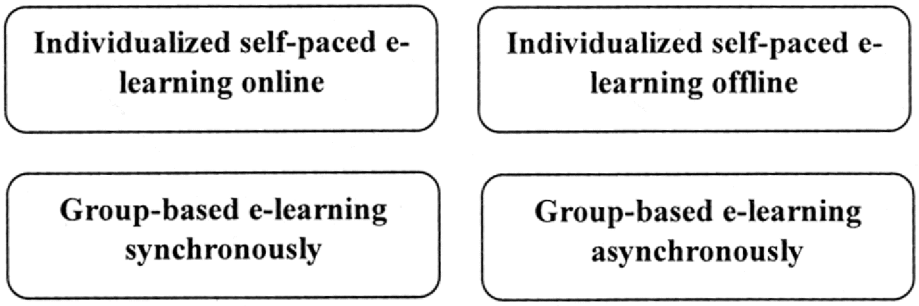
Social media: They became addicted to the phones, IPod, gaming consoles forgetting about outside activities and communication in the society.

4.5.2 E-LEARNING:

Concept of E-Learning : E-learning is commonly referred to the intentional use of networked information and communications technology in teaching and learning. A number of other terms are also used to describe this mode of teaching and learning. They include online learning, virtual learning, distributed learning, network and web-based learning. Fundamentally, they all refer to educational processes that utilize information and communications technology to mediate asynchronous as well as synchronous learning and teaching activities. On closer scrutiny, however, it will be clear that these labels refer to slightly different educational processes and as such they cannot be used synonymously with the term e-learning.

The term e-learning comprises a lot more than online learning, virtual learning, distributed learning, networked or web-based learning. As the letter "e" in e-learning stands for the word "electronic", e-learning would incorporate all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices. These various types or modalities of e-learning activity are represented in Table 1 (see also Romiszowski, 2004).

Table 1. E-Learning modalities



Individualized self-paced e-learning online refers to situations where an individual learner is accessing learning resources such as a database or course content online via an Intranet or the Internet. A typical example of this is a learner studying alone or conducting some research on the Internet or a local network.

Individualized self-paced e-learning offline refers to situations where an individual learner is using learning resources such as a database or a computer-assisted learning package offline (i.e., while not connected to an Intranet or the Internet). An example of this is a learner working alone off a hard drive, a CD or DVD.

Group-based e-learning synchronously refers to situations where groups of learners are working together in real time via an Intranet or the Internet. It may include text-based conferencing, and one or two-way audio and videoconferencing. Examples of this include learners engaged in a real-time chat or an audio-videoconference.

Group-based e-learning asynchronously refers to situations where groups of learners are working over an Intranet or the Internet where exchanges among participants occur with a time delay (i.e., not in real time). Typical examples of this kind of activity include on-line discussions via electronic mailing lists and text-based conferencing within learning managements systems.

E-LEARNING: DEFINITIONS:

As in any growing field of knowledge, the terminology in e-learning field has also not been standardized yet. Many scholars use the term differently and some use the same interchangeably. These terms do have their differences, and let's look at these:

Web-Based Instruction: It is a "hypermedia based instructional programme

which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported" (Khan, 1997).

Virtual Learning: "The educational process of learning over the Internet without having face-to-face contact is known as Virtual Learning" (French, et al., 1999). However for some, virtual learning may also include telelearning.

Online Learning: It is synonymous to web-based learning where learning is fostered via hypertext transfer protocol (http) in Internet or Intranet.

E-Learning: "The term e-learning covers a wide set of applications and processes including computer-based learning, web-based learning, virtual classrooms, and digital collaboration" (WR Hambraecht+Co., 2000: p.8). However, the term e-learning is becoming more and more accepted as substitute for web-based learning or online learning, falling in line with ecommerce and e-business.

From all these definitions, we can very well see that they have almost same meaning with different name. So, we may define e-learning as the use of networked information and communication technology in teaching and learning. The network being Internet or intranet is the most important aspect of the educational communication process, and its access and usability decide the kinds of interactions and teaching that may happen in e-learning.

PRINCIPLES OF E-LEARNING:

The principles may help teachers to choose resources; design teaching and learning activities based on those resources; and support such activities while they take place. Anderson and McCormick state that there is an implicit assumption in their approach that the more of the ten principles are embodied, the better the quality of the pedagogy; and the fewer embodied principles, the lower the quality.

Match to the Curriculum: The pedagogy should be matched with and aligned to the appropriate curriculum through clear objectives; the relevance of content covered; the appropriateness of student activities; and the nature of the assessment.

Inclusion: The pedagogy should support inclusive practice seen in terms of different types and range of achievement; physical disabilities that can be particularly supported by e-learning; different social and ethnic groups; and gender.

Learner Engagement: The pedagogy should engage and motivate learners. This engagement should be evident in an ethos of being both educational and motivating.

Innovative Approaches: It should be evident why learning technologies are being used, rather than a non-technological approach which achieves the same end as effectively. E-learning should be fit for purpose.

Effective Learning: This principle can be demonstrated in a variety of ways, for example, by using a range of different approaches in the learning platform that will allow the student to chose one that suits him/her, or that can be personalized to him/her, or by satisfying a number of the characteristics of good learning.

Coherence, Consistency and Transparency: The pedagogy must be internally coherent and consistent in the way the objectives, content, student activity and assessment match to each other. It must be open and accessible in its design.

ADVANTAGES AND DISADVANTAGES OF E-LEARNING:

Before we proceed further, it is worthwhile to look into the advantages and disadvantages of this new technology for teaching and learning. This will enable us to understand what can be done with this technology and what can't. The web-based learning environment provides tremendous advantages over traditional distance learning or classroom-based teaching.

ADVANTAGE:

E-learning has many advantages. With the combination of a well-organised e-learning system and a highly motivated student, one can achieve great success in a short period of time. Some of the major advantages of e-learning are listed below:

Convenient for students: E-learning materials are self-placed and can be accessed any time the learner wants. They do not require the learner to be physically present in a classroom. Students can also download and save the learning materials for future purposes from the system.

Lower cost: E-learning is usually a cost-efficient way of learning for most students as they can choose from a large range of courses and make the selection depending on their needs. It can also be cost-efficient for many universities because once the learning platforms are set up, they can be reused for many sessions.

Up-to-date learning materials: The study materials in e-learning systems can be updated more frequently than in the classroom-based education systems. Once the study materials are placed in the system, they can be updated without changing the whole materials and the materials can be available and reused for longer times.

Flexible way of learning: E-learning is a flexible way of learning for many students. Most of the study materials are stored for the students to access whenever they want. Students can also choose between an instructor-led and a self-learning system. In e-learning systems it is also possible for students to skip over the study materials they already know and choose the ones they want to learn.

World-wide learning society: E-learning systems help in creating a worldwide learning society as anyone can access the study materials regardless of the geographical location. In the systems available now learners can also contribute to the study materials, which helps to keep the materials updated.

Scalable e-learning systems: The number of students in virtual classes or e-learning systems can be very few or really high without causing any significant difference in the total cost.

Higher degree of freedom for students: One may find it difficult at times to learn new ideas. E-learning systems provide the possibility for students to learn the same material repeatedly until they are satisfied.

Better retention: The video and audio materials used in e-learning make the whole learning process more fun. This will help students to remember the things they learn for a long period of time. E-learning materials can also be accessed whenever wanted, thus the repetition makes the retention easier.

DISADVANTAGE:

In spite of its enormous advantages, the web-based learning is not devoid of problems. It is essential to understand these problems to design useful learning environment for the learners. Some of the problems associated with e-learning are:

Low motivation: Students with low motivation may not achieve the set goals most of the time, as there is noone to look over. Students are themselves responsible for the routine and organisation of the course, thus leading to laziness and low motivation at times. Lack of a fixed schedule and deadlines may lead to students dropping out of the course prematurely.

Technology-dependency: The study materials in e-learning are delivered using computer applications. For some people just to learn how to use those applications might take a long period of time. There are also other factors such as a poor Internet

connection and machine malfunction, which may make the learning process tedious and time consuming.

Compatibility issues: As there are many learning systems available, sometimes the study materials prepared by using one system may not be compatible with another. For example mobile devices such as iPads block the flash videos from being played in their browsers. Access to websites may not be free in all places as some countries impose restrictions on the number of websites that can be accessed.

Reliability of the content : The content available on the Internet might not always be reliable. There are people who mislead the readers and feed wrong information. So the readers must be careful while searching for the information and check the reliability of the content before learning it.

Social isolation: Lack of a real classroom or classmates might not be good for all students. Students might feel socially isolated at times due to lack of real people around while learning.

Expenses management: In the long run e-learning is usually a cheaper option but still for the first time it might prove too expensive for some institutions. Buying new equipment like computers, projectors or new software all at once might not always be easy for new or small institutions. Also the cost of developing training materials is high compared to the traditional methods.

Disadvantages for disabled students: While developing new study materials or study environments companies usually target at large user groups. They might not always think about disabled students such as visually impaired students as they might not gain from it as the development costs may be high.

Not effective in all cases: In some cases face-to-face study materials might be more effective than learning online as e-learning lacks two-way communication.

4.6 Summary

The 21st century has been named as 'age of knowledge' and there is no way in which one can deny the role of technology in different aspects of our lives. Like other fields, education too has been deeply impacted by technological revolution. This interface of education and technology is popularly known as educational technology.

Educational technology is the use of those audio-visual devices in training, which are based on modern technology, e.g., use of computer stimulators, television, radio, video-tape, etc. In this unit also discussed the concept, features, advantage & disadvantage of overhead projector, multi-media and smart classroom. Here, the last sub-unit we have to highlight ICT & E-learning. E-learning is a learning system which is based on formalised teaching but with the help of electronic resources. While teaching can be based in or out of the classrooms, the use of computers and the Internet forms the major component of E-learning.

4.7 Self-Assessment Questions

1) What is hardware technology?
2) Mention two characteristics of Audio aids.
3) Uses of Computer in Education.
4) Explain the uses of audio-visual aids.
5) What is Over Head Projector?
6) What is the functions of Multi-media?
7) What do you mean by Smart Classroom?
8) Write the Impact of Information Communication Technology (ICT)

4.8 Reference

Aggarwal, J. C. (2009). Essentials of Educational Technology. New Delhi: Vikas Publishing House.

Kochhar, S. K. (1985). Methods and Techniques of Teaching. New Delhi: Sterling Publishers.

Mangal, S. K.(2001). Foundation of Educational Technology. Ludhiana: Tendon Publication.

Mayer, R. E. (2005). Cambridge handbook of multimedia learning. New York, NY: Cambridge University Press.

Mangal, S.K. & Mangal, U.(2016),. Essentials of Educational Technology, PHI publication, Delhi

Mohanty, J,.(2008) Educational Technology, Deep and Deep Publications PVT. LTD, New Delhi

Sampath, K., A. Panneerselvam, S. Santhanam. (2007). Introduction to Educational Technology. New Delhi: Sterling Publishers.

Shankala, D.P. (2006). Educational Technology. New Delhi: Adhyayan Publishers and Distributors.

Sharma, K. K. (2007). Educational Technology. Delhi: Mahaveer & Sons Publishers and Distributors.

Sharma, R. A. (2002). Technology of Teaching. Meerut: International Publishing House.

Unit-5 ❑ Models of Teaching

Structure

5.1 Objectives

After the completion of the Unit, learners will be able to:

- Explain Concept, Nature and Scope of Models of Teaching
- Describe the various families of Models of Teaching.
- Understand the Information Processing Model: AOM and CAM
- Understand Assisted Teaching-Learning (SWAYAM, MOOCS and Swayam Prabha) and its application in Education

5.2 Introduction

Models of teaching refer to different models that help the teachers to enhance their teaching skills. Its allows the teachers to facilitate the overall learning curve of

students. There are several models, and these help them to develop an effective course curriculum for long-term and short-term courses. The teaching model help the faculty to develop the instructional materials. They use it in the classroom for effective teaching. These also help in upgrading the standard of learning in the institutions. This is also offer guidance to teachers and planners and expedite the process of educating. It enables them to evaluate and analyze their strengths and weaknesses and work on them. Teachers consider factors like social, personal, information process, and behavior while designing such models. The Information Processing Model is a framework used by cognitive psychologists to explain and describe mental processes. The model likens the thinking process to how a computer works. Just like a computer, the human mind takes in information, organizes and stores it to be retrieved at a later time. Computer Assisted Teaching-Learning a combination of text, graphics, sound and video in enhancing the learning process. The computer has many purposes in the classroom, and it can be utilized to help a student in all areas of the curriculum. It refers to the use of the computer as a tool to facilitate and improve instruction. In this unit we have to discuss about the SWAYAM, MOOCS and Swayam Prabha and their educational implications.

5.3 Models of Teaching : Concept, Nature, Families and Scope

5.3.1 Concept of Models of Teaching:

The term model is used to mean a teaching episode done by an experienced teacher in which a highly focused teaching behaviour is demonstrated, in it an individual demonstrating particular patterns which the trainee learns through imitation. It is a way to talk and think about instruction in which certain facts may be organized, classified and interpreted. Bruce Joyce and Marsha Weil describe a Model of Teaching as a plan or pattern that can be used to shape curricula, to design instructional materials and to guide instruction in the classroom and other settings.

Thus teaching models are just instructional designs. They describe the process and producing particular environmental situations which cause the student to interact in such a way that specific change occurs in his behaviour.

Models of Teaching are designed for specific purposes-the teaching of information concepts, ways of thinking, the study of social values and so on-by asking students to engage in particular cognitive and social tasks. Some models centre on delivery by the instructor while others develop as the learners respond to tasks and the student is regarded as a partner in the educational enterprise.

These are based on the following specifications:

Specification of Environment- It specifies in definite terms the environmental conditions under which a student's response should be observed.

Specification of operation- It specifies the mechanism that provides for the reaction of students and interaction with the environment.

Specification of criterion of Performance-It specify the criterion of Performance which is accepted by the students The behavioural outcome which the learner would demonstrate after completing specific instructional sequences are delineated in the teaching models

Specification of learning outcome- It specifies what the student will perform after completing an instructional sequence.

Definitions :

According to N.K.Jangira and Azit Singh (1983): *"A model of teaching is a set of inter-related components arranged in a sequence which provides guidelines to realize specific goal. It helps in designing instructional activities and environmental facilities, carrying out of these activities and realization of the stipulated objectives."*

Well and Joyce (1978): *A model of teaching consists of guidelines for designing educational activities and environments. It specifies ways of teaching and learning that are intended to achieve certain kinds of goals.*

Paul D. Eggen, et al. (1979): *Models are prescriptive teaching strategies designed to accomplish particular instructional goals.*

Jangira and Others (1983): *A model of teaching is a set of interrelated components arranged in a sequence which provides guidelines to realize specific goal. It helps in designing instructional activities and environmental facilities, carrying out of these activities and realization of the stipulated objectives.*

5.3.2 Nature of Models of Teaching:

Following are the Nature of a Teaching model:-

Encourage Art of Teaching: Teaching is considered as an art. Teaching models encourages this art by providing learning environment.

Development of Inherent Abilities: Teaching models bring about the qualitative development of personality as it helps in developing human. abilities. It also increases the teacher's social competency.

Based on Individual Differences: Teaching model uses the student's interest, as it is constructed on the basis of individual differences.

Influenced by Philosophy : Every teaching model is influenced by the philosophy of education. Hence, teachers formulate different models of teaching under the influence of the philosophy they believe.

Answers Fundamental Questions: In every teaching model answers to all the fundamental questions pertaining to the behaviour of students and teachers are included.

Providing Appropriate Experiences: Teaching models provides proper experiences to both teacher and student. Selecting the content and presenting it for learning before the students is the main essentiality of teaching. This difficulty is solved when a teacher presents appropriate experience before the students.

Maxims of Teaching: The basis of teaching model is the maxims of teaching. They are the foundation of each teaching model.

Practice and Concentration: The development of a teaching model is based on regular and continuous practice and concentration. The proper development of a teaching model is only possible when the assumptions are made clear by related thinking. These are based on the following specifications:

Specification of Environment: It specifies in definite terms the environmental conditions under which a student's response should be observed.

Specification of operation: It specifies the mechanism that provides for the reaction of students and interaction with the environment.

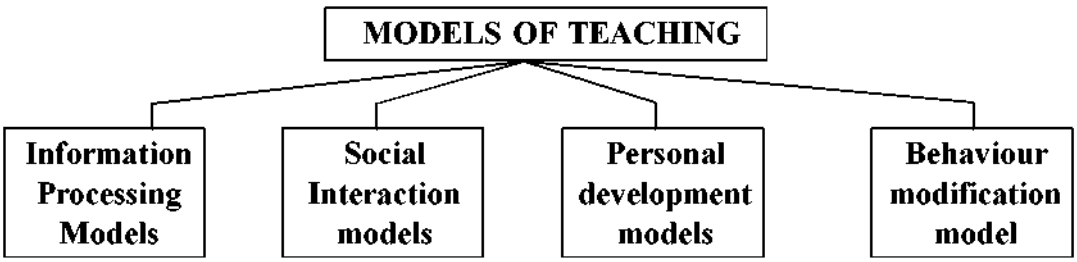
Specification of criterion of Performance: It specify the criterion of Performance which is accepted by the students. The behavioural outcome which the learner would demonstrate after completing specific instructional sequences are delineated in the teaching models

Specification of learning outcome: It specifies what the student will perform after completing an instructional sequence.

5.3.3 Families of Models of Teaching :

As said earlier, there exists many teaching models arising from a variety of sources representing different frames of reference towards educational goals and

methods. Many attempts have been made to classify them in some specific categories (Hilgard and Bower, 1977, Patterson. 1977: De Cecco and Crawford, 1977; Joyce and Weil, 1980, etc.). The latest attempt of Joyce and Weil needs special mention. By exploring many sources they have grouped the models on the basis of specific educational goals and means into the following four families:



Information Processing Models :

The term 'information processing' has been introduced by Joyce and Weil (1972). In their words, Information processing refers to the ways people handle stimuli from the environment, organise data, sense problems, generate concepts and solutions to problems, and employ serbal and non-verbal symbols.

Thus, the information processing models are more concerned with the intellectual growth rather than the emotional or social development of the individual. However, to some extent, all these models contribute towards the realization of personal and social goals. They are illustrated in Table no-1.

Sl. No.	Model	Developer
1	Inductive thinking model	Hilda Taba
2	Inquiry training model	Richard Suchman
3	Science inquiry model	Joseph J. Schwab
4	Concept attainment model	Jerome Bruner
5	Development model	Jean Piaget, Irving Sigel. Edmund Sullivan
6	Advance organizer model	David Ausubel

Source: Marsha Weil and Bruce Joyce (1978).

Social Interaction Models :

The models belonging to the family of social interaction models are concerned with the attainment of the social goals belonging to the affective domain. Consequently, the social interaction models as Weil and Joyce emphasize, "give priority for improvement of democratic processes and the improvement of the society by the improvement of the individual's ability (1978, p. 3). The models belonging to this category give more emphasis on the development of the society.

Table: The Family of Social Interaction Models

Sl. No	Model	Developer
1	Group investigation model	Herbert Thelen and John Deway
2	Classroom meeting model	William Glaser
3	Social inquiry model	Byron Massials and Benjamin Cox
4	Laboratory method model	National Training Laboratory Bethel, Maine
5	Jurisprudential model	Donald Oliver and James P. Shaver
6	Role-playing model	Frannie Shaftel and George Shaftel
7	Social simulation model	Sarene Borock

Source: Marsha Weil and Bruce Joyce (1978).

Personal Development Model :

The family of social development models also is concerned with the realization of the instructional goals belonging to the affective domain. They emphasize the processes by which individuals can establish productive relationship with their environment and design their unique individuality for realizi personal goals. Frequently, they focus on the emotional life of an individual and ultimately aim for the development of an integrated functioning self. The models belonging to this family are illustrated in Table no-3.

Table: The Family of Personal Development Models

Sl. No	Model	Developer
1	Non-directive model	Carl Rogers
2	Awareness training model	Fritz Pearls
3	Synectics model	William Gordon
4	Conceptual system model	David Hunt

Source: Marsha Weil and Bruce Joyce (1978).

Behaviour Modification Models:

The models belonging to the behaviour modification family are related to the behaviour modification theories. They have evolved from the attempts to develop efficient systems for sequencing learning tasks and shaping the behaviour through management of the reinforcement contingencies. More precisely, operant conditioning has given birth to most of the models belonging to this family.

Table : The Family of Behaviour Modification Models

Sl. No	Model	Developer
1	Contingency management model	Fred Edward Fiedler
2	Training model	Donald Kirkpatrick
3	Stress reduction model	Hans Selye
4	Desensitization model	Wolpe
5	Mastery learning model	Benjamin Bloom

Source: Marsha Weil and Bruce Joyce (1978).

The categorization of these different teaching models does not represent a watertight compartmentalization. These families are by no means antithetical or mutually exclusive. The instructional activities and learning environments emerging from some of the models, even though classified in different families, are remarkably similar. Also, within the families themselves models share many features in respect of the objectives and means to achieve them.

5.3.4 Scope of Teaching Model :

Model of teaching is a plan or pattern that can be used to shape curricula, to design instructional materials & to guide instruction in the class room & other setting. There are several field where the method of teaching used. Some Scope are given below:

1. In the construction of a curriculum or contents of a course.
2. In the proper selection of the instructional materials for teaching the prepared curriculum or course.
3. In guiding the teacher to select appropriate teaching techniques, strategies and methods for the effective utilization of the teaching situation and material for realizing the set objectives.
4. Designing appropriate educational activities. Arranging proper teaching environment.
5. Provide specific guidelines or blueprint in advance for the realization of the specific objectives by specifying the teaching activities and controlling the teaching-learning environment.
6. Give specific instructional designs for particular type of instruction in a specified teaching-learning situation.
7. They first specify the teaching or learning outcomes in behavioural terms and then lay down a step-by-step procedure for the attainment of these outcomes.
8. Help the teacher in his task in the same way as an engineer is helped in the construction of a building or bridge by an appropriate model or blueprint prepared in advance.
9. Save the energy, time and efforts of the teacher and the learners besides providing better economy to the best utilization of the other teaching-learning resources.
10. Models of teaching are known to serve three major functions in a given teaching learning situation, namely (i) designing specifying instructional objectives, (ii) developing and selecting instructional material, and (iii) specifying the teaching learning activities for the attainment of the stipulated instructional objectives.

FUNDAMENTAL ELEMENTS OF TEACHING MODEL:

Normally majority of teaching models are based on the following six elements:

FOCUS:

Focus is the central aspects of a teaching model. Objectives of teaching and aspects of environment generally constitute the focus of the model. Every teaching model is based on one or the other objective as its focal point. Any teaching model is developed by keeping this focal point in mind. Every teaching model differs from another in terms of its objectives. It is the nucleus of a teaching model. Every model is developed by keeping in view its focal point or objective. Every model has various phases, some particular types of competencies are developed by it.

SYNTAX:

Syntax of the model describes the model in action. Syntax includes the sequences of steps involved in the organization of the complete programmed of teaching. It is the systematic sequence of the activities in the model. Each model has a distinct flow of phases. It means the detailed description of the model in action. In it, the teaching activities and interactions between a pupil and the teacher are determined. The syntax of any teaching model means those points which produce activities focused on educational objectives at various phases. Under syntax, the teaching tactics, teaching activities and interaction between a student and the teacher are determined in such a pattern of sequence that the teaching objectives are achieved conveniently by providing desirable environmental situations.

PRINCIPLES OF REACTION:

Principles of Reaction tell the teacher how to regard the learner and to respond to what the learner does. This element is concerned with the way a teacher should regard and aspects respond to the activities of the students. These responses should be appropriate and selective. They provide the teacher with rules of thumb by which to select model, appropriate responses to what the student does. This element is concerned with the teacher's reaction to the students responses. In it he comes to know that how he has to react to the responses of the students and has to see whether the learners have been actively involved in the process, or not.

SOCIAL SYSTEM:

This element is concerned with the activities of pupil and the teacher and their mutual relationships. Every teaching model has separate objectives and will have

therefore separate social systems. It is related with the interactive roles and relationship between the teacher and the student, and the kinds of norms that are observed and student behaviour which is rewarded. The Social System describes the role of and relationships between the teacher and the pupils. In some models the teacher has a dominant role to play. In some the activity is centred around the pupils, and in some other models the activity is equally distributed. This element is based on the assumption that every class is a miniature society. In it also discussed the selection of motivating strategies and tectics for the students. Naturally social system occupies a central position in making the teaching impressive and successful in relation to the previously selected objectives. .

SUPPORT SYSTEM:

Support System describes the supporting conditions required to implement the model. 'Support' refers to additional requirements beyond the usual human skills, capacities and technical facilities. The support system relates to the additional requirements other than the usual human skills or capacities of the teacher and the facilities usually available in the ordinary classroom. Teacher requirements refer to special skills, special knowledge of the teacher and special audio-visual material like films, elf-instructional material, visit to special place etc. This includes books, films, laboratory kits, reference materials etc. It means the additional requirements beyond the usual human skill, capacities and technical facilities. In it, the evaluation is done by oral or written examination, whether the teaching objectives have been achieved or not. On the basis of this success or failure, clear idea is achieved regarding the effectiveness of strategies, tactics and techniques used during teaching.

APPLICATION :

It is an important element of a teaching model. It means the utility or usage of the learnt material in other situations. Several types of teaching modes are available. Each model attempts to desirable the feasibility of its use in varying contexts related with goal achievements in terms of cognitive, and affective behaviour modification.

5.4 Information Processing Model (AOM and CAM)

Information Processing Model :

Information processing theory is a method of studying cognitive development that emerged from the American experimental psychology tradition. The information processing approach is used by developmental psychologists to explain mental

development in terms of maturational changes in basic components of a child's mind. The hypothesis is predicated on the premise that rather than just responding to stimuli, humans digest the information they receive. This viewpoint considers how the mind functions similarly to a computer. In this sense, the mind works like a biological computer, evaluating information from the outside world. According to the standard information-processing model for mental development, the mind's machinery includes attention mechanisms for bringing information in, working memory for actively manipulating information, and long-term memory for passively holding information so that it can be used in the future. This theory addresses how as children grow, their brains likewise mature, leading to advances in their ability to process and respond to the information they received through their senses. The theory emphasizes a continuous pattern of development, in contrast with cognitive-developmental theorists such as Jean Piaget's theory of cognitive development that thought development occurs in stages at a time.

ADVANCE ORGANIZER MODEL (AOM) :

Advance Organizer Model is given by David Ausubel who is one of the educational psychologist. This theory of meaningful verbal learning deals with three concerns:-

- How knowledge (curriculum content) is organized;
- How the mind works to process new information (learning); and

How teacher can apply these ideas about curriculum and learning when they present new material to students (instruction). This model is designed to strengthen student's cognitive structure.

In this model teacher plays the role of organizer of subject matter and presents information through lectures, readings and providing tasks to the learner to integrate what has been learned. In this approach, teacher is responsible for organizing and presenting what is to be learned. The learner's primary role is to master ideas and information. The Advance Organizers provide concepts and principles to the students directly.

According to Ausubel whether the material is meaningful or not depends more on the preparation of the learner and on the organization of the material than it does on the method of presentation.

Structures:

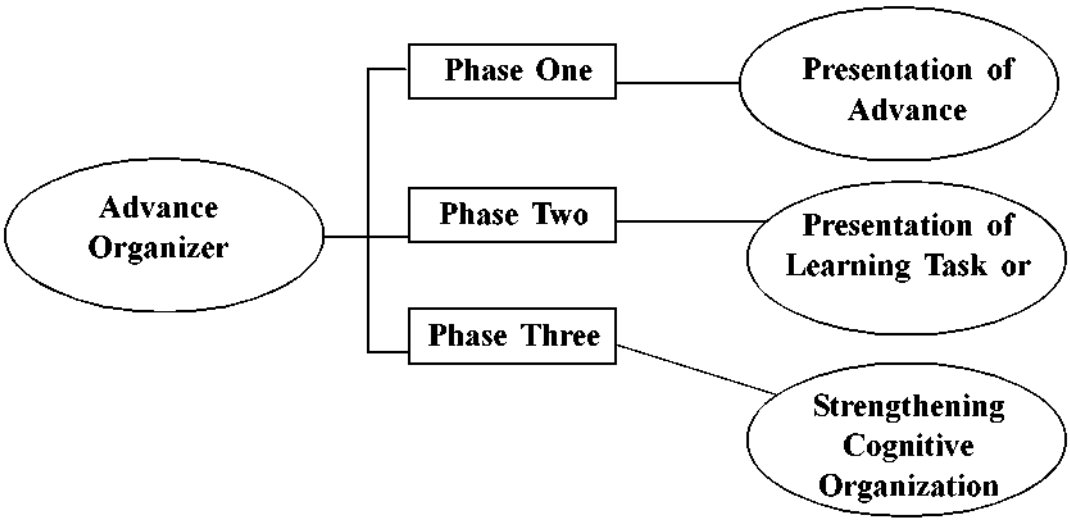
- ❖ Ausubel maintains that a person's existing cognitive structure is the foremost factor governing whether new material will be meaningful and how well it can be acquired and retained.

❖ As per the views of Ausubel there is a parallel between the way subject matter is organized and the way people organize knowledge in their minds (their cognitive structures).In the present study AOM is used as a tool to help the students to attain the concepts of English Grammar with the comprehension of study material of secondary level IX grade students.

COMPONENTS OF ADVANCE ORGANIZER MODEL

Syntax:

The Advance Organizer Model has three phases of activity. Phase one is the presentation of the advance organizer; Phase two is the presentation of the learning task or learning material; and Phase three is the strengthening of cognitive organization. Phase three tests the relationship of the learning material to existing ideas to bring about an active learning process.



Phase	Outline	Activity
Phase One	**Presentation of Advance Organizer**	• Clarify aims of the lesson. • Present organizer : Identify defining attributes • Give examples • Provide context • Report

		• Promptawareness of learner's relevant knowledge and experience.
Phase two	**Presentation of Learning task or Material**	• Present material. Maintain attention • Make organization explicit • Make logical order of learning material explicit
Phase three	**Strengthening Cognitive organization**	• Use principles of integrative reconciliation. • Promote actie reception learning • Elicit critical approach to subject matter. Clarify.

Social System : In Advance Organizer Model the teacher retains control of the intellectual structure, to relate the learning material to the organizers and to help students differentiate new material from previously leads to the successful acquisition of material.

Principles of Reaction: Negotiation of meaning and responses between the teacher and the learner clarifies the meaning of the new learning material with existing knowledge of the students. Mutual interaction between teacher and learner responsively connect organizers and learning material.

Support System: The effectiveness of the advance organizer depends on an integral and appropriate relationship between the conceptual organizer and the content. This model provides guidelines for recognizing structural materials.

Application of Model: The model is especially useful to structure extended curriculum sequences or courses and to guide students systematically in the key ideas. Following are the main application of this model:

1. Abstract subjects which can't be seen or presented, can be easily taught by this model.

2. Cognitive aims can be achieved by this model. Selection, organization, presentation and expression can be achieved.
3. We would expect on increase, too in the learner's grasps of factual information which could be linked to and explained by the key ideas, the concept of ideas. The concept of socialization can be drawn in the study of socialization patterns in different cultures. This advance organizer thus aids in expanding students knowledge about cultures.
4. It can also be shaped to teach the skill of effective reception learning. Critical thinking and cognitive reorganization can be explained to the learners, who receive direct instruction in orderly thinking and in the notion of knowledge hierarchies.
5. This model is considered good and used widely in school. When we present the subject in organized way, student gets all matter in systematic order. In less time, more knowledge can be given.
6. The instructional effect of this model is that the ability to learn from reading, lectures, and other media is used. Presentation is another effect, as an interest in inquiry and precise habits of thing.

CONCEPT ATTAINMENT MODEL (CAM):

Introduction:

JS Bruner and his colleagues developed the concept attainment model. Teachers provide accurate information about the nature of content to students by using this model. This model is effectively used in the clarification and interpretation of new concept. "A concept is a symbol that stands for a class of group of objects or events that possess common properties. Concepts greatly simplify our thinking processes. They make free us from having to level and categorize each new object or event we encounter." The objective of this model is to enhance the student's ability of inductive reasoning and to improve the students' concept. Dr Anand (1966) writes by expressing his ideas about the origin of concepts in human, "Bruner and his colleagues has the perception that the human lives in an atmosphere, that has so many variations and complexions that human can not understand it without classification. Therefore every human tries to understand the objects founded in the his environment and classifies objects. As a result of the classification of objects, concepts are developed in them. These concepts evolve naturally, yet training is necessary for the development of the right concept.

Exemplars:

Essentially the examplars are a subset of a collection of data or a data sets. The category is the subset or collection of examples that share one or more characteristics that are missing in the others. It is by comparing the positive examplars and contrasting them with the negative ones that the concept or category is learned. In the present study CAM is used as a tool to help the students to attain the concepts of English Grammar.

Characteristics of Concept Attainment Model:

(1) This model is more productive when concepts are tried to learn and understand on the basis of examples.

(2) This model cannot be used to improve generalization, to provide the knowledge of facts, to answer why, and to specify reason.

(3) This model is more useful for learning languages.

(4) It tries to make understand the fundamental principles of maths and science in a simple and easy way.

(5) This model is more productive in all subjects in which there are more chances of concept formation.

Using this model is founded successful for all subjects. This model has proved useful at all stages. While using it for little children, easy concepts and their simple illustrations should be used. This model is not used for providing innovation information, it will be better to use information process of other models.

The Model:

Bruner was mainly a cognitive psychologist and was interested in the field of development of mental abilities. In later stages he was concerned with teaching profession. In one article he wrote.

"Any subject can be taught effectively in some intellectually honest form to any child at any stage of development" (Bruner in The Process of Education, 1960).

In later stages he, with his co-workers, developed the Concept Attainment Model of Teaching.

According to Bruner et al. "concept attainment refers to the process of finding predictive defining attributes that distinguish exemplars from nonexemplars of the class one seeks to discriminate"

Thus in the definition of concept attainment, there are some new terms which should be clarified first.

Concept Attainment:

Concept attainment is "the search for and listing of attributes that can be used to distinguish exemplars from non- exemplars of various categories" (Bruner, yet Good now and Austin, 1967). It is the process of identifying the attributes that characterizes a particular category".

For example: table has the following attributes: (1) flat horizontal surface, (i) leg or legs, (iii) suitable height for use, (iv) objects can be placed on it (v) made of wood or metal.

Concept Formation:

Concept attainment and concept formation are different. For example, a child is learning to distinguish between the categories of dangerous and harmless snakes. He does not know the different attributes of dangerous and harmless snakes. But he has already formed some concepts about it. He has to find something distinguishing characters which can differentiate between harmless and dangerous snakes. This is known as 'concept attainment. The combined process is known as concept learning So concept learning is the combination of concept formation and concept attainment.

Attributes:

The characteristic features of a concept are called attributes. For example, "A Green Circle" has three attributes number, colour and shape. Attribute Values: Values are the attributes of a concept. In the above example there are values of three attributes e.g. a green and circle.

Exemplars and Non-exemplars: Examples (called exemplars) are instances of the concept. It can be positive and negative. For example, the concept is an 'orange'. Then each fruit is an example and banana, apple etc. are non-exemplars and orange is an exemplar.

The categorizing activity of concept has two components: concept formation is the first component the second component.

The Concept Attainment Model:

The concept attainment model is the process of defining or identifying concepts by finding those attributes that are absolutely essential to the meaning of the concept and disregarding those that are not; it also involves learning to discriminate between what is and is not an example of the concept.

In course of experimentation Bruner has identified four strategies in concept attainment.

They are as follows:

(i) Simultaneous scanning strategy

(ii) Successive scanning strategy

(iii) Conservative focusing strategy

(iv) Focus gambling strategy

(1) Simultaneous scanning strategy:

In this strategy the learners use positive examples to deduce invalid instances, This is a crude technique, because it puts a great strain on students' memory.

(ii) Successive scanning:

In this strategy the subject verifies the correct concept in a successive stage one by one. This technique is not so effective as it does not give any new information.

(iii) Conservative focusing:

According to Bruner, this technique is more effective, as the subject uses a correct instance as a point of reference.

(iv) Focus gambling:

Here more than one attributes are considered at a time. This strategy is called gambling because the subject takes a chance with varying attributes two at a time.

Steps in the Model:

The concept attainment model includes the following steps:

1. The concept is selected and defined; text or dictionary definitions should not be automatically used.
2. Select of the attributes or examples are made.
3. Positive and negative examples are developed: positive examples must have all the correct attributes and may have some non-essential attributes.
4. Introduction of the process to the students is made.
5. Presentation of the examples and list the attributes are made.
6. Students develop a concept definition.

7. The teacher will give additional positive and negative examples and then students give examples to assess their understanding.
8. The teacher will discuss the process with the class.
9. Students are assessed.

Phases of the Concept Attainment Model (CAM):

Focus:

"The focus defines the field of search for the students. It may eliminate nonrelevant lines of enquiry. Often it pitched at a level of abstraction just above the exemplars". The main focus of the model is to develop inductive reasoning of the students. Bruner and his associates orient their work for the description of a process by which the students discriminate the attribute of the things, persons, and events and place them into categories. The students are also taught about the concept which is of great use to them in order to live successfully in different life situations,

Syntax:

The phases of the syntax are as follows:

Phase-I: Presentation of data and identification of concept:

Here -

(a) The teacher presents definite examples;
(b) Students compare examples in positive and negative examples;
(c) Students generate and test hypothesis.
(d) Students state a definition according to the essential attributes.

Phase Here II: Testing attainment of the concept:

(a) Students identify additional unlabeled examples as yes or no.
(b) Teacher confirms hypothesis, names concepts and restates definitions according to essential attributes.
(c) Students generate examples.

Phase III: Analysis of thinking strategies:

Here,

(a) Students describe thoughts.
(b) Students discuss role of hypothesis and attributes.
(c) Students discuss type and number of hypothesis.

In Phase I data are presented to the learner. These are any events, persons or any other matter which can be differentiated. The learners are directed that all positive examples have one idea in common and their duty is to develop a hypothesis about the nature of the concept. They are asked to compare and justify the concepts from the given examples. Finally they are encouraged to from rule, name the concept according to that rule etc.

In Phase II students test their attainment. This is done first by identifying the unlabelled examples and then by setting their own examples. Thus the original hypothesis is accepted or rejected and their choice is revised or modified.

In Phase III students begin to analyse the thinking strategies to attain the concept. Some students try to frame broad construct and gradually narrow it down. Others try to frame it in other ways and become specific in discussing the hypothesis.

3. Principles of Reaction:

When the model goes on in the actual classroom situation, the teacher will act as a supportive system of the students' hypothesis. They will develop dialogue with the students to establish or reject their hypothesis. Thus they will help students to analyse their concepts and strategies in the later part. The teacher should encourage, at this stage, to access various other strategies and find out their merits and limitations. The important principles of reaction may be put forward as follows:

(a) The teacher is to remain supportive to the dent's hypothesis, but emphasises that they are hypothetical in nature.

(b) The teacher has to keep record by keeping track of the hypothesis (concepts) of the attributes as they are mentioned by the students. (c) The teacher is to remain supportive to the students' attention and help them to analyse their concepts and strategies.

(d) The teacher will encourage analysis of the merits of alternative strategies rather than attempting to seek one strategy for all students in all times.

4. Social System:

Before starting, the teachers will arrange the concepts in graded difficulties, organise the materials with positive and negative examples. The text books available in the market are not written according to the need of the students. So, here the duty of teachers is very important. The teachers will have to prepare exemplars and non-exemplars, prepare extract ideas and materials from other sources and design them according to the requirement of the learners' intellectual ability.

The social system of the model demands from the teacher to place responsibility of identifying and verifying the concept on the students. The teacher should try to communicate the students that the solution to the problem of identifying the concept lies not within the teacher but in the data (examples). (Eggen et al. 19979)

5. Support System:

Lessons of the model require positive and negative exemplars. Here the task of the student is not to develop other concepts than those selected by the teacher. For this reason data sources should be arranged beforehand and students can explain the example with its characteristics and discriminate it from non-examples.

Application of Bruner's Concept Attainment Model CAM):

The model provides an excellent way to teach concepts through the use of examples and it also helps the students to understand unfamiliar concepts. It can be used to teach concepts related to any discipline or area of the curriculum. Some of the applications of the model are given below:

(i) It can be effectively used in language teaching. In grammar teaching it is also useful, because here exemplars and non-exemplars can be effectively used

(ii) The model is also useful in teaching of different branches of science because discovery, enquiry and hypothesis framing and testing can be properly used.

(iii) It can be used with all children of all ages and grades.

(iv) The model can also be used as a useful evaluative tool for the teachers. A quick estimate of the mastery of the students can also be assessed by this model.

(v) Lastly, this model can be made as a foundation of non-machine relationship in modern teaching learning system.

Merits of the model:

Merits of the model are as follows:

(a) It develops thinking and reasoning capacity of the students.

(b) The model keeps students active during the teaching learning system. (c) It develops imagination power of the students.

(d) It also encourages self study of the students.

(e) The model helps students in systematic approach in developing study habits.

(f) It also helps students to apply their knowledge in other different fields. Limitations of Bruner's Concept Attainment Model.

Demerits of the Model:

Some of the limitations of the model are as follows:

(a) The model demands high returns from the students and the teachers.

(b) Students have their own individual differences. Due to this some students may not move at par with other students.

(c) Sometimes it is also difficult to apply the model in big classes.

5.5 Computer Assisted Teaching-Learning: SWAYAM, MOOCS and SWAYAM PRABHA

Computer Assisted Teaching-Learning

"Computer-assisted instruction" (CAI) refers to instruction or remediation presented on a computer. Many educational computer programs are available online and from computer stores and textbook companies. They enhance teacher instruction in several ways.

Computer programs are interactive and can illustrate a concept through attractive animation, sound, and demonstration. They allow students to progress at their own pace and work individually or problem solve in a group. Computers provide immediate feedback, letting students know whether their answer is correct. If the answer is not correct, the program shows students how to correctly answer the question. Computers offer a different type of activity and a change of pace from teacher-led or group instruction.

Computer-assisted instruction improves instruction for students with disabilities because students receive immediate feedback and do not continue to practice the wrong skills. Computers capture the students' attention because the programs are interactive and engage the students' spirit of competitiveness to increase their scores. Also, computer-assisted instruction moves at the students' pace and usually does not move ahead until they have mastered the skill. Programs provide differentiated lessons to challenge students who are at risk, average, or gifted.

5.5.1 SWAYAM:

SWAYAM is stands for Study Webs of Active –Learning for Young Aspiring

Minds programme that has initiated by the Ministry of Human Resource Development (MHRD), Government of India and here different professors from different subjects are engaged and moreover the faculties from the reputed bodies viz. IITs, IIMs, central universities will offer online courses to the citizens of India.

SWAYAM is an instrument for self-actualisation responsible for the life-long learning. Here learner can choose from hundreds of courses, virtually every course that is taught at the university / college / school level and these shall be offered by best of the teachers in India and elsewhere. Student studying in any college and university can earned the credit by taking courses and moreover persons working or not working may engaged with the SWAYAM and even persons working in school or out of school may interact with SWAYAM it is offered extended and huge educational opportunity to gain knowledge.

All the courses under SWAYAM programme is free though fees would be applicable in case of less students or students seeking certifications. Here is the few facts on SWAYAM :

A. In the first phase the SWAYAM program has been started in different organizations and educational institutes viz. IIT Bombay, IIT Madras, IIT Kanpur, IIT Guwahati, University of Delhi, Jawahar Lal Nehru University, IGNOU, IIM Bangalore, IIM Calcutta, Banaras Hindu University and lateron faculties from foreign universities also been added into the program. ˆ

B. There are many areas where SWAYAM platform may be added viz. engineering education, social science, energy, management, basic sciences. Initially one crore students are expected to benefited in 2 to 3 years timeframe. ˆ

C. India is one of the few countries in the world has this kind of online interactive learning systems and platform. Ultimately this provides wide-range of audio and video lectures, reading material and complete assessment system. ˆ

D. The then President of India (Dr. Pranab Mukherjee) initiated the SWAYAM portal to offer quality and advanced education to the doorstep to everyone. Moreover apart from this, another platform called SWAYAM Prabha also been enhanced and gear-up the 32 DTH channels; it is dedicated for the advanced telecasting and advanced content free of charge with the help of GSAT-15.

SWAYAM PROGRAM:

Applications and Core Agenda SWAYAM started by the MHRD, Government of India and responsible for the three cardinal principles of Education Policy (access, equity and quality) and importantly the objective of this effort is offering quality and advanced teaching learning resources to the advanced learners and also most disadvantaged pupils. SWAYAM is also offered to bridge the gap of digital divide those who are untouched by the digital revolution and also helpful for the improving the knowledge and ultimately it helps in developing and creating knowledge economy. The system is lies on advanced and smart IT platform for hosting all the courses and importantly it is taught for the students of standard of Nine (9) to till post-graduation and accessible to anyone and anywhere at any time. Most of the courses under SWAYAM is interactive and designed by the best teachers in the India and also available and free of cost to Indians. 1,000+ faculty and teachers from different branches throughout Country actually participated in preparing SWAYAM courses and program]. SWAYAM courses are having 4 quadrants viz. ˆ

- video lecture/s ˆ
- Reading material that can be downloaded/printed ˆ
- self-assessment tests and quizzes ˆ
- online discussion forum for clearing the doubts and knowledge

For enhancing and enriching learning experience different types and good amount of audio-video and multi-media / technology are using in this systems. The best quality contents are produced for the SWAYAM. And for its improvement total nine National Coordinators have been appointed and they are includes (including their roles): ˆ

1) AICTE (self-paced and international courses) ˆ
2) NPTEL (for engineering) ˆ
3) UGC (non technical post-graduation education) ˆ
4) CEC (under-graduate education) ˆ
5) NCERT & NIOS (school education) ˆ
6) IGNOU (school students) ˆ
7) IIMB (management studies) ˆ
8) NITTTR (Teacher Training program).

Scope of SWAYAM:

As per Government of Indian (Department of Higher Education, Ministry of Human Resource Development, 2015) SWAYAM shall cover the following:

a) Curriculum based course contents covering diverse disciplines such as arts, science, commerce, performing arts, social sciences and humanities subjects, engineering, technology, law, medicine, agriculture etc. in higher education domain (all courses would be certificationready in their detailed offering).

b) School education (9-12 levels) modules; for teacher training as well as teaching and learning aids to children of India to help them understand the subjects better and also help them in better preparedness for competitive examinations for admissions to professional degree programmes.

c) Skill based courses, which cover both post-higher secondary school skills that are presently the domain of polytechnics as well as industrial skills certified by the sector skill councils of various Ministries.

d) Advanced curriculum and professional certification under a unified scheme in higher education domain that can be tailored to meet the demands of choice based credit system (CBCS) currently being implemented in India at undergraduate level.

e) Curricula and courses that can meet the needs of life-long learners of Indian citizens in India and abroad.

The SWAYAM is four quadrant approach:

The four Quadrant approach means e-learning system that has the following components (The Gazette of India, 17th August 2016):

Quadrant-I is e-Tutorial: that shall contain: Video and Audio Content in an organized form, Animation, Simulations, Virtual Labs.

Quadrant-II is e-Content: that shall contain: PDF/e-Books/ illustration, video demonstrations, documents and Interactive simulations wherever required.

Quadrant-III is Web Resources: that shall contain: Related Links, Open Content on internet, Case Studies, Anecdotal information, Historical development of the subject, Articles.

Quadrant-IV is Self-Assessment: that shall contain: MCQ, Problems Quizzes, Assignments and solutions, Discussion forum topics and setting up the FAQ, Clarifications on general misconceptions.

Advantages of SWAYAM

1. The SWAYAM is free of cost for any Indian for learning but he has to pay for certificate. The SWAYAM is tailor maid to Indian scenario and are complimentary to formal education in India.
3. The accessibility of quality teachers was limited to the institutes like IITs, IIMs, and top most Universities and institutions of India but through SWAYAM the learner in any corner of the county can have access to these top most teachers of the county.
4. The courses will add to the skill India program.
5. The quality of learner is evaluated by the same parameters at national level so the outcome will be the same at national level. It will helps in maintaining the stand of education in India.
6. The high quality education will reach to the mass at minimum cost and efforts by the government.

5.5.2 MOOCS (Massive Open Online Courses):

Introduction:

"A MOOC is an online course with the option of free and open registration, a publicly shared curriculum, and open-ended outcomes. MOOCs integrate social networking, accessible online resources, and are facilitated by leading practitioners in the field of study." (McAuley, Stewart, Siemens & Cormier 2010, p.10)

Massive - enrolment numbers

Open - no mandatory qualifications

Online - fully

Course - structured, temporal

The term MOOC was coined by Dave Cornier, The first MOOC came in 2008 from the University of Manitoba. It is the latest buzz word; the unique feature of MOOC is providing education to public, at minimum level of cost at world scale and to deliver an attestation of completion to those who fullfil their study. This makes it attractive especially for the developing countries. The major players like Cousera, Udacity and Edx witness high number of enrolments from India. A course is designed for few weeks and imparted on web. Assignments are given to be solved using the collaborative learning. The students take up exam at the end and are given certificate.

A MOOC on software architecture and cloud computing was conceptualized and offered for six weeks during January and February by Professor Prabhakar of Indian Institute of Technology, Kanpur (IITK) and Dr Balwinder Sodhi of IIT Ropar (IITR). The course material was offered at three levels: one, it was open for anyone to browse; two, learners would need to register to attempt the assignments; and three, the learners would need to pay a registration fee of INR 900 to get a certificate. That makes this MOOC partially 'open'. The reason for this was to discourage non-serious participants. The course started with just under a 1000 registrants, 470 of whom opted to pay the certification fee. Subsequently, 370 received certificates, a 37% success rate. This smaller MOOC demonstrated a much higher success rate than the bigger MOOCs which typically show completion rates of fewer than 10%.

Massive Open Online Courses (MOOC's) are witnessing a huge demand among the students, with majority of Indian students enrolling into foreign universities. When elite colleges are offering courses free of cost to students, it is definitely an offer hard to resist. As Coursera, a major player in the MOOC sector gets second highest enrolments from India. The growth of the MOOC has potential to address the problem of meeting increasing demand for higher education, particularly in developing countries where it is almost impossible to build enough traditional institutions to cope with the number of prospective students. Daniel (2012) believes the new openness movement is a real game changer, as it has potential to widen access to life-long learning, address key gaps in skill development, and ultimately enhance the quality of life for millions. There is even some hope in India that MOOC courses may be able to play an important role in closing the growing inequality gap of literacy and in reducing youth unemployment. The national institutes of India like IIMs and IITs also have started MOOC courses. The Government of India has also decided to start 350 online courses through SWAYAM (Budget 2017-18). There is a need to create a solid systematic structure for the validation and recognition of accomplishment of the courses from online sources as Coursera, Edx and SWAYAM, UGC, and other educational authorities which seeks cooperation between these institutions.

The Historical Background of MOOCs:

The MOOCs have just born and, therefore, are in a process of transformation and settlement and nobody can categorically say what a MOOC is. But in some way, MOOCs are the natural evolution of Open Course Ware, first created by the Massachusetts Institute of Technology (MIT) in 2001. Therefore, it does not surprise

that the MIT also leads the development of MOOCs, first with MITx, and then with edX. The term Massive Open Online Courses (MOOCs) was first introduced in 2008 by Dave Cormier to describe Siemens and Downes, "Connectivism and Connective Knowledge" course. This online course was initially designed for a group of twenty-five enrolled, fee paying students to study for credit and at the same time was opened up to registered only learners worldwide. As a result, over 2,300 people participated in the course without paying fees or gaining credit (Wikipedia, 2012). In 2011, Sebastian Thrun and his colleagues at Stanford opened access to the course they were teaching at the university, "Introduction to Artificial Intelligence", and attracted 160,000 learners in more than 190 countries (Wikipedia, 2012). Since then, MOOCs have become a label for many recent online course initiatives from institutions, individuals and commercial organisations. The original aim of MOOCs was to open up education.

Many initiatives have been taken by the Indian government to provide and support concept of open education. Initially, the objective was to provide open resources in terms of repositories, libraries, educational media files, e-books, etc. These were made accessible for everybody. Some of the efforts in this direction started as National Digital Repository of IGNOU, Sakshat providing e-content, Shishya for XI-XII Standards by CBSE Board, and Vidya Vahini integrating IT into the curriculum of rural schools by providing interactive training and developmental communication. Most of these initiatives started with establishing dedicated department to make education reachable to many learners as much as possible. Some of the common names in this path are, Education and Research Network (ERNET) connecting various colleges and schools by providing network connectivity; EDUSAT, a satellite launched for education in India, Consortium for Educational Communication (CEC), use the power of television to act as means of educational knowledge dissemination; Information and Library Network Centre (INFLIBNET) autonomous Inter-University Centre for connecting university libraries, also it has started several other programs. These all are the initiatives towards open education and education with Information technology still MOOC was out of their reach.

In India, the institutes with the organizational capabilities along with the governing authorities are trying to serve the grown educational need of the learners, by offering MOOCs in the country. May be the efforts are in the process to grow yet and serve at the rate of growth in demand. Top institutes (IITs, IIMs, IISC) and authorities (UGC, AICTE, MHRD) have always been involved in the initiative of serving quality education learners in India including traditional as well as the online education.

Some of projects serving currently for providing online education are NPTEL, mooKIT offered by IIT Kanpur, and IITBX of IIT Bombay. The most recent initiative started by the government is "SWAYAM", started with a goal to serve at a very large scale and to cope with the increased needs of the learner's.

Table-1 Historical Development of MOOCs in India.

Initiative	Year of Launch	Institution behind Platform	Website Link
NPTEL	2003	IIT Madras	nptel.ac.in/
mooKIT	2012	IIT Kanpur	www.mookit.co/
IITBX	2014	IIT Bombay	iitbombayx.in/
SWAYAM	2016	MHRD and	Microsoft

FEATURES OF MOOC PLATFORMS:

We have identified certain features of MOOC platform. Also, there are some self-paced courses that do not have any time restriction to join a course and always available for enrolment. Self-paced courses are only 6% all MOOCs offered. Therefore, we have identified some of the features provided by the MOOC platform, which are as follows-

Course Format: Whether the platform delivers self-paced courses or scheduled course?

Learning Model: Which learning model is supported by the platform, online or blended?

Number of courses: a platform is running at present.

Number of users: already registered in any course of the platform.

Institutional Credits: Whether other institution provides credit for courses completed on the MOOC platforms.

Platform Language: What are the languages in which the platform is provided? Mobile App: Do the platform have an App?

App Platform: For which platform, android and/or iOS the app is provided.

The features of the platform are listed in Table 2

Table 2. Features of the MOOC Platforms.

Provider	Course Format	Learning Model	No. of Course	No. of Users	Institutional Credits	Platform Language	Mobile App	App Platform
NPTEL	Scheduled	Online	1200	1.5 Million	Partial	English	Yes	Android
MooKIT	Scheduled	Blended	15	0.1	Partial	English, Hindi, Kannada, French, Russian, Ukrainian	No	
IITBX	Scheduled, Self-Pace	Online	63	1.25 Million	Partial	English	No	-
SWAYAM	Scheduled, Self- Pace	Blended	172	Not Known	Yes	Hindi, English	Yes	Android iOS

CHALLENGES FOR MOOC IN INDIA

Some of the major concerns regarding the implementation of MOOCs in India are, the lack of technological infrastructure, investment, diversified population, quality of courses, adoption of MOOC among learners and their acceptance by the academic institutions.

Technological Infrastructure

MOOC needs the high speed internet connections for accessing the content delivered in their courses. In a developing country like India, Internet and computers comes under luxury and their availability is confined mainly to the urban areas. Limited availability of requisite infrastructure to access MOOCs has confined the extensive spread of MOOCs. India needs to work towards providing a better Internet access for the country's population and provides worldwide connectivity.

Investment

Offering the MOOC is a costly affair that includes the cost of infrastructure, platforms, content creation, human resources and many more. In India, the institutions

do not have many capitals to invest in such event so it is not easy for an individual institution to offer such services. There is need of involvement from some authorities, who can invest in the process to support the education. Even Indian government needs to liberalize conventional regulations and restrictions and encourage public private partnership for creating MOOCs in this country.

Diversified Needs

India is a widely diversified country having multicultural societies and different languages spoken. For acceptance of MOOC among the huge domain of audience, they need to agree upon a common language of speaking. English as this language accepted globally, again throws away a considerable amount of audience who do not possess the knowledge or adequate fluency in English. So, a switch over to mostly English based courses as offered via current MOOCs often discourages learner to continue their courses. The courses should also be offered in some regional languages, which may be a tedious task and prone to loss of uniformity and quality. Therefore, language is one of the barriers for learners from Indian origin that need to be addressed by the MOOC providers in a more realistic way. Moreover, the challenge is to deliver the lecture, designing of the course material, and the platform itself, in a way that can be understood by all. Hence forth, the main motive should be to work in the direction which can minimize the existing differences amongst the learners.

Adoption of MOOC among learners

Generally in MOOC courses the communication between a teacher and learner and among learner as well is in written form. It results in the lack of oral communication skills among the learners and to improve this they need undergo a traditional program. Also, watching the course videos of other content on a computer screen can make the learner feel isolated. Due to this, motivation of learner falls resulting in dropping out from the course. Moreover, the courses that require lab or hands-on training may not fulfil the purpose completely in online mode .Therefore, the challenge faced by MOOC could be adoption of technology by learners.

Quality

To create and deliver quality content in MOOC, quality of teachers and technical staff is required. India has huge vacancies of teachers not filled, compounded by infrastructure deficit as the absence of laboratories. Also, it may be possible that teachers are not technically sound to create course content using the tools. Emerging initiatives internationally and nationally are working towards offering quality educational by providing their content as open resources, but some of them are

constraint by the adoption policies of their country or organization. India should also need to leverage these initiatives as a readily available, economically viable source of quality content or adoption. Also, a national quality assessment framework to assess the quality and adoption of new approaches like, credit transfer, MOOC, integrated courses etc., should be adopted along with teacher training, their performance related appraisal and midterm re-evaluation. Thus a complete revamp is needed to meet the present demand and address the challenges that India is facing in offering MOOCs.

Besides these there are the following important aspects of MOOCs-

- Although digitalization is a must now, there are many nations that are unable to provide the basic necessities to enroll for MOOCs hence the spread of MOOCs are limited.
- It is not always certain that all MOOCs provide degrees, certificates and/or diplomas which limits the number of candidates that enroll for these courses as many companies ask for records of the education levels achieved and candidates are unable to provide them with the same.
- A student's life is confined to one room that has internet access and a laptop or a computer which allows little or no interaction with the outside world.
- Since MOOCs are web-based, there is no monitoring of the candidates/students, which carries a risk of plagiarism or cheating.

Need and Importance of MOOCs:

- MOOCs, particularly xMOOCs, deliver high quality content from some of the world's best universities for free to anyone with a computer and an Internet connection;
- MOOCs can be useful for opening access to high quality content, particularly in developing countries, but to do so successfully will require a good deal of adaptation, and substantial investment in local support and partnerships;
- MOOCs are valuable for developing basic conceptual learning, and for creating large online communities of interest or practice;
- MOOCs are an extremely valuable form of lifelong learning and continuing education;
- MOOCs have forced conventional and especially elite institutions to reappraise their strategies towards online and open learning; institutions have been able to extend their brand and status by making public their expertise and excellence in certain academic areas;

- MOOCs main value proposition is to eliminate through computer automation and/or peer-to-peer communication the very large variable costs in higher education associated with providing learner support and quality assessment.
- There's nothing particularly new about MOOCs. Most universities have offered online courses for many years and the basic technologies involved – video lectures, discussion forums, tests, and the like – are the same we have used with on-campus and distance students. The only difference is the scale.
- By their very nature – large numbers of students, no direct faculty interaction with individual students, a "pre-programmed" course of study and assessments – MOOCs would appear to have what some have called limitations when compared with a traditional face to face course or smaller online credit course with high faculty involvement. However, these aren't limitations as much as features that make MOOCs unique.
- MOOCs are built on efficiency of scale, giving access to the teaching of a world class professor to thousands of students at once. The lectures, assessments and activities for a course – especially an online course – and the expertise of the professor behind the content isn't cheap and, in many cases, is unique to a particular university. A MOOC throws open the door of the professor's classroom, allowing him to teach more than just a few dozen students at a time.
- Because of the scale, "hands on" involvement by the faculty member is limited. This shifts the responsibility for learning the material squarely on the shoulders of the individual student and their motivations to learn. It also shifts conversation and dialogue about the content to a more diverse student population that could be worldwide – a community of learners.
- MOOC courses aren't fixed into traditional term and semester models of the university, so they can start any time and can be of any length. That makes the MOOC compelling for short-term courses that are highly focused on a topic or a series of courses that might build towards a deeper understanding in a knowledge area.
- Finally, MOOCs aren't bound by traditional university credentialing – they can be offered with or without a certificate or "badge" indicating that a student has completed the course. The credential can be separate from the class itself.
- These features that make MOOCs unique – scale, learning communities, scheduling and credentialing flexibility – says that these types of online courses

can solve certain problems in higher education that take advantage of the format, rather than trying to fit the MOOC into the more traditional university credit course box.

5.5.3 SWAYAM PRABHA:

Swayam-Prabha is really a wonderful initiative of Ministry of Human Resource Development under National Mission of Education through ICT. The objective of the program is to deliver the qualitative academic contents up to last zenith of the academic society where there is no facility of proper classroom, academic institutions, and teachers due to any reason. Through technology, they can get the qualitative educational contents even can participate in rapidly changing world and give their contribution also for upliftment of the National in general and their vicinity societies in particular.32 DTH channels which are accessible 24×7 through out the year are offering the contents of different disciplines which include arts, science, commerce, performing arts, social sciences and humanities, engineering, technology, law, medicine, agriculture, etc. Moreover, high quality educational programmes are being telecast using GSAT-15 Satellite. GSAT-15 is a very powerful tool to augment the bandwidth of Direct-to-Home television. The contents contributed by the IITs, UGC, NPTEL, IGNOU, NCERT, and NIOS. The INFLIBNET Centre maintains the web portal.

- The channels are uplinked from BISAG, Gandhinagar.
- The contents are provided by NPTEL, IITs, UGC, CEC, IGNOU, NCERT and NIOS.
- The INFLIBNET Centre maintains the web portal.

Key point of SWAYAM Prabha:

- It is an initiative of the Ministry of Human Resources Development to provide 32 High Quality Educational Channels through DTH across the length and breadth of the country on 24X7 basis.
- It has curriculum-based course content covering diverse disciplines.
- This is primarily aimed at making quality learning resources accessible to remote areas where internet availability is still a challenge.
- The DTH channels are using the GSAT-15 satellite for programme telecasts.

PURPOSE OF SWAYAM-PRABHA PROGRAM:

The prime purpose to develop such program is to impart the qualitative education to students particularly those who could not join their courses regular basis and have

been residing in remote areas where institutions and colleges are not easily accessible. This program contained 32 DTH channels which devoted to telecasting of high-quality educational programme on 24×7 basis using the GSAT-15 satellite. The beauty of the program is that the students can choose the schedule to access the channels according to their convenience as new contents for at least four hours which would be repeated 5more times in a day. It offers the academic contents from very basic to post graduate level. Even it assists the students of class 11th & 12th prepare the competitive examinations. Moreover, it also offers the curriculum based contents.

SCOPE OF SWAYAM PRABHA:

❖ **Higher Education :**

Curriculum-based course contents at post-graduate and under-graduate level covering diverse disciplines such as arts, science, commerce, performing arts, social sciences and humanities, engineering, technology, law, medicine, agriculture, etc. All courses would be certification-ready in their detailed offering through SWAYAM, the platform for offering MOOCs courses.

❖ **School education (9-12 levels):**

Modules for teacher's training as well as teaching and learning aids for children of India to help them understand the subjects better and also help them in preparing for competitive examinations for admissions to professional degree programmes.

❖ **Curriculum-based courses**

The DTH Channels cover curriculum-based courses that can meet the needs of life-long learners of Indian citizens in India and abroad.

❖ **Competitive exams**

The DTH Channels assist students (class 11th and 12th) prepare for competitive exams.

Swayam Prabha portal features:

- Comprehensive portal for SWAYAM-PRABHA;
- Login based access for admin stake holder (Channel coordinator, MHRD, BISAG and DTH-Chennai);
- Searching of video content on different parameter such as channel-wise, subject-wise, etc Panel for channel coordinator to create programme-schedule and metadata creation of each video-content;

List of Channels :

Channel No.	Channel Name	Route/Parent
Channels 01-10 are managed by CEC, New Delhi.		
1	Channel 01: VAGEESH: CEC/UGC: Humanities- 1, Language and Literature	EMRC, EFLU, Hyderabad
2	Channel 02: SANSKRITI: CEC/UGC: Humanities- 2, Arts, History, Philosophy and related Subjects	CEC, New Delhi
3	Channel 03: PRABODH: CEC/UGC: Social Science -1, Sociology, Political Science and related subjects	EMRC Jodhpur
4	Channel 04: SAARASWAT: CEC/UGC: Social Science - 2, Education, Psychology, Home Science and related subjects	CEC, New Delhi
5	Channel 05: PRABANDHAN: CEC/UGC: Social Science - 3, Management, Library Science, Information Science and related subjects	MCRC Jamia Milia
6	Channel 06: VIDHIK: CEC/UGC: Social Science - 4, Law, Legal Studies, Human Rights and related subjects	EMRC Patiala
7	Channel 07: KAUTILYA: CEC/UGC: Economics, Commerce and Finance	EMRC Ahmadabad
8	Channel 08: ARYABHATT: CEC/UGC: Physical sciences, Mathematics, Physics, Chemistry and related Subjects	EMRC ,University of Calicut

9	Channel 09: SPANDAN: CEC/UGC: Life Sciences, Botany, Zoology, Bio-Science and related subjects	EMRC, Kashmir University, Srinagar
10	Channel 10: DAKSH: CEC/UGC: Applied Sciences, Allied Physical and Chemical sciences and related subjects	EMRC, Anna University, Chennai
Channels 11 to 18 are Managed by NPTEL		
11	Channel 11: NPTEL: Chemical Engineering, Chemistry and related Subjects	IIT Kharagpur
12	Channel 12: NPTEL: Civil Engineering and related subjects	IIT Delhi
13	Channel 13: NPTEL: Computer Science and Engineering	IIT Kharagpur
14	Channel 14: NPTEL: Electrical engineering, Electronics and Communication Engineering and related subjects	IIT Delhi
15	Channel 15: NPTEL: Engineering Sciences and general subjects for engineering	IIT Madras
16	Channel 16: NPTEL: Humanities, Social Sciences and Management	IIT Kanpur
17	Channel 17: NPTEL: Mechanical Engineering and related subjects	IIT Kanpur
18	Channel 18: NPTEL: Mathematics, Physics, Metallurgy and related subjects	IIT Tirupati / IIT Madras
Channels 19 -22 are managed for high School students by IIT Delhi and is called IIT PAL		
9	Channel 19: IIT PAL: Biology	IIT PAL 1 IIT Delhi
20	Channel 20: IIT PAL: Chemistry	IIT PAL 2, IIT Delhi
21	Channel 21: IIT PAL: Mathematics	IIT PAL 3. IIT Delhi
22	Channel 22: IIT PAL: Physics	IIT PAL 4, IIT Delhi

Channels 23 to 24 are managed by IGNOU New Delhi.		
23	Channel 23: IGNOU: Liberal Arts and Humanities	IGNOU, New Delhi
24	Channel 24: IGNOU: Agriculture, Vocational and Allied Sciences	IGNOU, New Delhi
Channel 25 is managed by the NIOS, New Delhi.		
25	Channel 25: NIOS: D.El.Ed (Regional Language)	NIOS, New Delhi
Channel 26 is managed by IGNOU New Delhi.		
26	Channel 26: IGNOU: State Open Universities' programs	IGNOU, New Delhi
Channels 27 and 28 are managed by the NIOS, New Delhi.		
27	Channel 27: NIOS: Secondary School Education	NIOS, New Delhi
28	Channel 28: NIOS: Higher Secondary School Education	NIOS, New Delhi
Channels 29 is managed by UGC-INFLIBNET, Gandhinagar.		
29	Channel 29: UGC-INFLIBNET (PG Subject's & YOGA)	UGC-INFLIBNET,Gandhinagar
Channel 30 is managed by the NIOS, New Delhi.		
30	Channel 30: NIOS: Gyanamrit	NIOS, New Delhi
Channel 31 is managed by NCERT.		
31	Channel 31: NCERT: School and Teacher Education	NCERT, New Delhi
Channel 32 is managed by IGNOU and NIOS jointly		
32	Channel 32: IGNOU and NIOS: Teacher Education	IGNOU and NIOS, New Delhi

5.6 Summary

A model of teaching is a plan or pattern that can be used to shape curricula, to design instructional materials & to guide instruction in the class room & other setting.

In this unit teaching methods and principles of programmed learning are discussed. Ausubel Model is primarily concerned to help you as a teacher to organize and convey large amount of information meaningfully and effectively. This model is designed to strengthen student's cognitive structure. Concept attainment model is developed to teach a process for investigating and explaining unusual phenomena and development of the concept. Also discussed the concept, nature and functions of Computer Assisted Teaching-learning like SWAY AM, MOOCS and Swayam Prabha.

5.7 Self-Assessment Questions

1. What is Models of Teaching?
2. Describe the Nature of Models of Teaching.
3. Explain the different Families of Models of Teaching.
4. Discuss the Scope of Models of Teaching.
5. What do you mean by Advance Organizer Model?
6. Explain the Educational Applications of Concept Attainment Model.
7. Write the Scope of SWAYAM.
8. Discuss the Importance of MOOCs in Education.
9. What is the Key point of SWAYAM Prabha?

5.8 Reference

Aggarwal, J. C. (2009). Essentials of Educational Technology. New Delhi: Vikas Publishing House. Kochhar, S. K. (1985). Methods and Techniques of Teaching. New Delhi: Sterling Publishers. Mangal, S. K.(2001). Foundation of Educational Technology. Ludhiana: Tendon Publication.

Mayer, R. E. (2005). Cambridge handbook of multimedia learning. New York, NY: Cambridge University Press.

Mangal, S.K. & Mangal, U.(2016),. Essentials of Educational Technology, PHI publication, Delhi

Mohanty, J,.(2008) Educational Technology, Deep and Deep Publications PVT. LTD, New Delhi

Sampath, K., A. Panneerselvam, S. Santhanam. (2007). Introduction to Educational Technology. New Delhi: Sterling Publishers.

Shankala, D.P. (2006). Educational Technology. New Delhi: Adhyayan Publishers and Distributors.

Sharma, K. K. (2007). Educational Technology. Delhi: Mahaveer & Sons Publishers and Distributors.

Sharma, R. A. (2002). Technology of Teaching. Meerut: International Publishing House.

Unit-6 ❑ Technology Adoptions & Blended Learning

Structure

6.1 Objectives

After the completion of the Unit, learners will be able to:

- Analyze the Technology Adoptions in Formal Education.
- Analyze the Technology Adoptions in Non- Formal Education.
- Explain the concept and scope of Blended Learning and its Application.

6.2 Introduction

In this unit we have to discuss the technological adoption in Formal education and Non-formal education. The role of technology, in a traditional school setting, is to facilitate, through increased efficiency and effectiveness, the education of knowledge and skills. Non Formal Education Center basically conducts the literacy, post-literacy and awareness raising programs. It also implements the programs related to life long and continuous education, skill development and income generation.

In this unit also we have to discuss about the blended learning. Blended learning is known as hybrid learning, is an approach to education that combines online

educational materials and opportunities for interaction online with traditional place-based classroom methods. Blended learning focuses on giving personalized experiences to the learners exposing them to web sources, e-learning, online platforms, games and ICT models. These encourage the students to retain their interest and inculcate self-learning procedures, the best ways in excelling a language.

6.3 Technology Adoptions in Formal Education

Introduction :

Formal education is a structured, organized educational model that is constructed and administered according to a set of laws and standards, with a fairly rigid curriculum in terms of aims, content, and methods. It is characterized by a continuous educational process known as "presential education," according to Sarramona1, which necessitates the participation of the instructor, the students, and the institution. It is similar to the educational method used in our schools and institutions. Formal education institutions are administratively, physically, and curricularly arranged, and students are required to attend at least half of their classes. Teachers and students must follow a programme that includes intermediate and final examinations in order to advance students to the next level of learning. It awards degrees and diplomas in accordance with a set of regulations.

The setting-up of a formal education system does not consider the students' standards, values and attitudes that are relevant to the education system which, generally, is not tested or assessed at the level of student acceptance, as well as for efficacy and efficiency.

ADOPTIONS OF TECHNOLOGY IN FORMAL EDUCATION:

In a traditional educational context, technology's function is to promote knowledge and skill education by increasing efficiency and effectiveness. To thoroughly investigate this concept, we must first define a few terminology. The phrase efficiency refers to the speed with which we acquire knowledge, but the term effectiveness refers to the quantity of taught knowledge that is operationally learned. Both students and teachers can be considered learners when technology is directly used to an educational context, such as a school. Thus, we can operate under the assumption that any increase in teacher knowledge and utilization has the impact of increased learning in students. Ultimately, technology should serve to increase student achievement in schools.

Technology can help with educational accomplishment in two ways: removing physical impediments to learning and shifting the focus from information retention to knowledge application. In order to see their worth and influence in educational contexts, each of these strategies must be analysed in connection to both the student and the instructor. The following are some of the technologies used in formal education:

Visual Technology Aid :

Smart Boards are a technologically-advanced type of chalkboard. Special "markers" are used to write on the boards to display. Interactive media can display website pages and software programs so the class can see the program's applications.

Computer Technology Aid:

Many students need more than just the traditional direct teaching method in order to be successful in the classroom. Computer technology allows students to work on programs that enhance learning. Word processing help students with typing and publishing papers. There are a variety of programs that help students practice skills, review material and test specific skills.

Internet Technology Aid:

The Internet can provide resources and websites for practicing skills and monitoring student progress. It also has resources for teachers pertaining to student management, lesson plans and other teaching matters.

Projectors:

Projectors are a basic way to introduce technology to students in the classroom. The projector is hooked up to the teacher's laptop and projects the screen from the laptop to the white board in the front of the room. This enables students to see a larger version of what is on the laptop screen. A teacher can project a word document and show students' note-taking strategies. The teacher can also show PowerPoint presentations to students using the projector. Students can follow the teacher as he or she goes onto educational websites as well. A projector in the classroom is a remarkable tool in engaging the student with technology. For different uses, different types of projectors available which are as follows.

1. Video Projectors
2. Slide Projectors
3. Overhead Projectors

4. Opaque Projector (book reader)
5. LCD / DLP Projectors

SMART Technologies:

SMART Technologies are leading the way in classroom interaction between students and teachers using computers. SMART boards are a fantastic way for students to stay engaged in lessons. A SMART board is an interactive white board that allows the teacher to project an image from a laptop to the front of the room. The amazing part is that the teacher can then digitally draw on that image. Graphs and tables are available templates in SMART boards. SMART boards can store lessons and digitally enhance plain templates into customized learning tools. Hundreds of applications are possible with this technology, and students are benefiting immensely from it.

Mimio Boards (Interactive-white boards):

Mimio boards are similar to SMART boards. They are interactive white boards that allow the teacher to manipulate computer functions on the white board in the front of the room. Sensors are in place in the board that allows the teacher to use a special pen that acts like a mouse. Teachers maneuver through websites, graphs and other lessons using this technology. Students can even participate by using the board for PowerPoint presentations. This is a fantastic tool in interactive classroom lessons.

Classroom PCs:

Some teachers are fortunate enough to have personal computers for each of their students. Learning takes on a whole new meaning when every student gets their own laptop. For example, during a writing lesson, a teacher can allow pupils to use Word applications to follow along. Students can also conduct independent research and exploration. PCs are more efficient at storing a student's work than folders. When every student has access to the Internet on his or her own time using a personal computer, bulky encyclopaedias and dictionaries are no longer essential. In the classroom, a paperless environment can be both structured and environmentally sustainable. Finally, having their own unique tool to improve academic achievements empowers students in their education.

Robotics:

New technology aids students in becoming acquainted with the world of modern work through problem solving, in addition to facilitating the learning process. Robotics, programming, and 3D printing are being used to reinvent school science projects.

These are the foundations of many professions that are presently in demand on the labour market and have a bright future ahead of them.

Robotics helps students get acquainted with all branches of the STEM system (science, technology, engineering and mathematics), which opens the door to future professional advancements. Creating a robot does not mean only designing it and making its parts through 3D printing, but also programming its behavior. This might sound complicated, but at many schools, even the younger students are introduced to the basics of robotics and other technological advancements (according to age and intellectual development).

VR technology:

Virtual reality (VR) and augmented reality (AR) are two relatively new technological breakthroughs that provide the classroom a new dimension. Students can visit remote locations and interact with ancient civilizations or dinosaurs using virtual reality headsets. This is a great way to complement the learning process by gaining close encounters that aren't possible in real life (climbing a mountain, going to space).

On the other hand, augmented reality entails an "enhancement" of reality, where digital elements are blended with real ones, which positively affects student engagement. Perhaps the most popular example of AR technology around the world is the game Pokémon GO, where the players walk on actual streets looking for the creatures from the game. This technology is useful in areas other than gaming, and there is no doubt that the possibilities that this powerful tool brings along are a part of the fabric of the future of education.

Cloud technology:

One of the best examples of the usefulness of learning technology is the implementation of cloud technology. Earlier use of computers in education was limited, as the sharing of data was comparatively complicated. Nowadays, school devices are interconnected using online software that keeps data in a cloud. This means that all information available on the server is accessible to all students.

Now it is much easier to solve team tasks, and share information and multimedia using cloud services such as Office365 or Google Drive. There are also specific educational apps that introduce children to this type of data exchange. The additional benefit of these cloud services is the price, which is a lot lower than that of buying specific software for each school device. This technology is especially important in eLearning, when a teacher uploads assignments and multimedia content for students.

Flipping the Classroom:

How can we make the most of the time we have in the classroom with our students? Moving the lecture out of the classroom and using in-person time for interactions that require applying, synthesising, and producing can sometimes be a terrific strategy to advance students toward greater levels of comprehension. Although "flipping" does not need the use of technology, resources such as films, podcasts, online quizzes, and the like can aid in the collaboration of in-class and out-of-class activities.

These resources discuss the theory behind this teaching style as well as practical tips for implementing it.

6.4 Technology Adoptions in Non-formal Education

As can be seen, formal education has a distinct set of characteristics. When one or more of these are missing, we can confidently conclude that the educational process has taken on non-formal characteristics. As a result, we can state that a given education system has non-formal education features if it is not presential most of the time - non-contiguous communication. Non-formal education characteristics are also evident when the implemented technique does not necessitate student attendance, reducing teacher-student contact, and the majority of activities take place outside the institution, such as home reading and paperwork. Educative processes with adaptable curricula and methodology that may adjust to students' needs and interests, and in which time is not a fixed factor but is determined by the student's work rate, certainly do not correspond to those comprised by formal education, but fit into the so-called non-formal education. Proportionally to the number of formal education factors that are absent from a process, we find several grades of non-formal systems.

Computer Assisted Learning (CAL):

The term Computer Assisted Learning (CAL) refers to a variety of computer-based software that try to deliver interactive learning in a given subject area. These can range from complex and expensive commercial packages to apps produced by other educational institutions or national efforts to basic solutions built by individuals with no funding or support to address a very local problem. The amount of time and money spent on development is significant, and this is partly due to the highly subject-specific nature of the education market, as well as the highly personalised nature of the teaching process - particularly at the FE and HE levels - which makes commercial success difficult to achieve and work done in one subject rarely transfers to another.

In general, the use of computers in education through CAL has been sporadic a great deal of effort was expended with little general impact. Many of those academics that took part in that earlier crusade are now cynical about the effectiveness of computers in teaching.

There are still good reasons to use CAL rather than Internet based technologies. CAL is run either straight from a CD or floppy disk drive or over a local network so the constraint of the internet - slow download times for multimedia matesrials may not apply. This, coupled with the fact that CAL technology has been around a bit longer, means that CAL packages have the potential to offer more advanced, interactive, multimedia learning experiences than it is currently reasonable to expect from the Web. This has been changing as Web technologies develop and bandwidths improve but there are currently many things that can only be achieved with CAL rather than the Web and CAL has been an integral part of the curriculum in many departments at Warwick for some time.

Digital Resources:

This could range from simply placing Word documents on the Web for your students to download and print or making your PowerPoint presentations available after a lecture to creating Web pages that make better use of the media to streamed digital video and simple interactive CAL-like programs.

Computer Mediated Communication (CMC)

CMC can refer to any method by which individuals and groups communicate via the Internet. CMC can be synchronous (exchanges happen in real time) or asynchronous (exchanges happen at a later time) (messages are posted up at any time, and read and responded to by other users also at times which suit them; in other words, users do not have to be online at the same time, as they do with synchronous exchanges). Asynchronous communication includes email, mailing lists, Usenet, and computer conferencing, whereas synchronous communication includes IRC, Internet telephony, and videoconferencing. All of these forms of CMC can now be accessed via the Internet, using a basic Web browser. Which type of CMC you use will depend on what kind of discussion you want to take place? Each has their strengths and weaknesses both in terms of technical constraints and the type of interaction that they encourage.

The Main Technologies Include:

1. Email - the most popular Internet tool, used to exchange messages between individuals

2. Mailing lists - which use email to enable communication among groups of

people. Individuals send emails to the list email address and receive a copy of all emails sent to that address

3. Usenet Newsgroup - a separate Internet system which allows users to read and contribute to global special-interest 'newsgroups'; the number of newsgroup topics is vast, and subjects range from the very dry to the totally bizarre

4. Computer conferencing - (sometimes also known as 'discussion boards' or more accurately 'threaded discussion lists') which enables groups of people to hold discussions by reading and posting text messages on a computer system. The advantages over mailing lists are that the messages are archived and the structure of the discussion is also recorded. Computer conferencing is widely used to support learning, and within the educational context is generally what people mean when they talk about 'CMC'

5. Internet Relay Chat (IRC) - an Internet system which allows users to chat 'live' (in real time) using text or audio Internet telephony, a way of using the Internet as an alternative to the main telephone

network; currently in its teething phase, though exciting in that it has the potential to reduce the cost of calling long-distance to that of a local call

6. Videoconferencing - a means by which small groups of geographically distant people can hold discussions in real time, during which they are able to hear and see each other and share various other types of data. Working with remote experts via distance technologies word pdf html.

7. Hybrid Systems - systems such as Web Board combine threaded discussion lists, IRC and email lists allowing users to switch easily between the two depending on the nature of the discussion. See also Yahoo Groups which is a free online service allowing you to set up a Web based email discussion list with optional forwarding to and replies from your normal email account. It also offers a facility to share documents and images.

ONLINE COMMUNICATION TOOLS

Effective communication is the key to successful teaching and learning, whether in a physical classroom or a virtual classroom. However, maintaining online communication with not one, but over twenty students is undoubtedly challenging. Communication platforms help overcome it; they enable communication with larger groups, with video conferencing, instant messaging, audio calls, virtual rooms, and more, with any device and from anywhere.

Some of the tools in demand are :

Zoom
MS Teams
Skype
Google Meet

Zoom: With teams across the world working remotely during the COVID-19 pandemic, video conferencing tools like Zoom have become extremely popular. Zoom helps businesses and organizations bring their teams together in a frictionless environment to get more done. Ther easy, reliable cloud platform for video, voice, content sharing, and chat runs across mobile devices, desktops, telephones, and room systems.

Zoom is publicly traded on Nasdaq (ZM) and headquartered in San Jose, California. Zoom is a cloud-based video conferencing tool that lets you host virtual one-on-one or team meetings easily. With powerful audio, video and collaboration features, this remote communication tool connects remote team members with each other.

Zoom's key features include :

HD video chat and conferencing Audio conferencing using VoIP (Voice over Internet Protocol) Instant messaging Virtual backgrounds for video calls Screen sharing and collaborative whiteboards Hosting video webinars

MS Teams Microsoft:

Teams is a cloud-based team collaboration product that is part of the Office 365 package. Business messaging, calling, video meetings, and file sharing are among Microsoft Teams' primary features. Teams can be used by companies of all sizes.

Teams is Microsoft's primary cloud-based unified communications platform, and it competes with Slack, Cisco Webex Teams, and Google Hangouts. Teams is a workplace communications programme that allows local and remote employees to collaborate on material in real time and near real time across a variety of platforms, including computers and mobile phones. Other Office 365 applications, such as Exchange, PowerPoint, and SharePoint, are integrated with Microsoft Teams.

Skype:

Skype is a telecommunications application that specializes in providing video chat and voice calls between computers, tablets, mobile devices, the Xbox One console, and smart watches over the Internet. Skype also provides instant messaging

services. Users may transmit text, video, audio and images. Skype allows video conference calls.

Although Skype is a commercial product, its free version is used with increasing frequency among teachers, schools, and charities interested in global education projects

Google Meet:

Google Meet (formerly known as Hangouts Meet) is a video-communication service developed by Google. It is one of two apps that constitute the replacement for Google Hangouts, the other being Google Chat. Google planned to begin retiring Google Hangouts in October 2019.

Features of Google Meet include:

- Two-way and multi-way audio and video calls with a resolution up to 720p
- An accompanying chat
- Call encryption between all users
- Noise cancelling audio filter
- Low-light mode for video
- Ability to join meetings through a web browser or through Android or iOS apps
- Integration with Google Calendar and Google Contacts for one-click meetin calls
- Screen-sharing to present documents, spreadsheets, presentations, or (if usin a browser) other browser tabs
- Ability to call into meetings using a dial-in number in the US
- Hosts being able to deny entry and remove users during a call.

Google Meet (formerly known as Hangouts Meet) is a video-communication service developed by Google. It is one of two apps that constitute the replacement for Google Hangouts, the other being Google Chat.

Securely connect, collaborate, and celebrate from anywhere. With Google Meet, everyone can safely create and join high-quality video meetings for groups of up to 250 people. Starting in early May 2020, anyone with an email address can sign up for Meet and enjoy many of the same features available to our business and education users, such as simple scheduling and screen sharing, real-time captions, and layouts that adapt to your preference, including an expanded tiled view.

Online Whiteboards:

Online whiteboards or digital whiteboards help emulate the classroom whiteboard/ blackboard experience with the students. Most of these tools offer an infinite canvas with shape libraries for creating different types of diagrams, charts, graphs, and other visualization purposes (i.e. creating posters, graphic organizers, etc.).

Social Networks:

For many teachers, the mere mention of social networks conjures the image of distracting software that prevents students from learning. This can be true, but it's also possible to harness the power of social media and use it in such a way that it actually benefits students. However, each form of social media has its own set of strengths. These are just a few of the ways that teachers are taking social networking and using it as a way to enhance the education process.

Facebook:

Facebook can be considered a 'hub' social network since it allows teachers to create group pages that students can join. These pages can be used in a number of ways to keep students up to date on what's going on in the class. Teachers can write up important announcements and pin them to the top of the group page. Or, they can announce reminders in the normal group feed to alert students when homework, quizzes, and tests are coming up.

Facebook groups can also be used by teachers to encourage conversation between students. Questions can be used to encourage responses and students can discuss materials on the group page. This is an easy way of encouraging participation among students.

Twitter:

Twitter is less of a hub than Facebook because there is no way to create a dedicated page that students can join and work from. Where Twitter derives all its power from is its use of hashtags. Hashtags can be created by teachers and used to encourage group participation. For instance, a teacher can create a hashtag like #PhilsHistory. Then, every student who uses that hashtag in their tweets will be discoverable when the class searches for the hashtag, PhilsHistory.

In class, teachers can use this to get questions or responses from students. A projection of the Twitter feed can be projected onto a wall and teachers can go through their lectures. As they do, students can Tweet using that hashtag to ask the teacher

a question in the middle of their lecture. The question will come up on the Twitter feed as long as the class has already searched for that hashtag. The same process can be used to get responses to class-wide questions the lecturer might ask. This can help encourage participation even from shy students.

Instagram:

Instagram is similar to Twitter, but instead of posting and sending Tweets, it focuses on taking and sharing images. Students can use Instagram to snap images and tag them with a hashtag. Using the hashtag #PhilsHistory as an example, students on a field trip to a historic place can photograph and tag interesting features of the site. When the class returns to the classroom, a search for the hashtag will bring up all of the images taken during the tour. After that, the teacher and students can talk about which photos were shot and why they were chosen. After that, the teacher can lead a discussion regarding the significance of the structures or locations that pupils photographed.

This is just one example of how social media can be used to enhance the classroom. Any class that is going to be engaging in hands-on projects can use photography to enhance the experience. Science field trips can capture interesting animals and plants in photos. Students working on engineering projects can photograph each stage of what they're building and then walk their peers through the process in a class discussion. Teachers can also use Instagram as a basic way of capturing classroom memories. A year's worth of work can be better remembered when students capture each moment in photos and share them with each other using the class' hashtag. This is also an easy way of encouraging parental participation, since they can search the hashtag themselves and see everything that students are doing in the classroom.

Modern Technology use in Non-formal Education:

Hundreds of digital education tools have been created with the purpose of giving autonomy to the student, improving the administration of academic processes, encouraging collaboration, and facilitating communication between teachers and learners.

1. Edmodo

Edmodo is a social networking site and educational platform that connects teachers and students. Teachers can use this one to organise online collaborative groups, administrate and distribute instructional materials, track student progress, and interact with parents, among other things. Edmodo has over 34 million users who connect to create a more enriched, personalised, and aligned learning process that takes advantage of technology and the digital environment.

2. Socrative

Socrative is a system that allows teachers to build exercises or educational games that students may complete using mobile devices such as smartphones, laptops, or tablets. It was created by a group of entrepreneurs and engineers that are passionate about education. Teachers can view the outcomes of the exercises and adapt following classes to make them more personalised as a result.

3. Project

Projeqt is a tool that allows you to create multimedia presentations, with dynamic slides in which you can embed interactive maps, links, online quizzes, Twitter timelines, and videos, among other options. During a class session, teachers can share with students academic presentations which are visually adapted to different devices.

4. Thinglink

Thinglink allows educators to create interactive images with music, sounds, texts, and photographs. These can be shared on other websites or on social networks, such as Twitter and Facebook. Thinglink

offers the possibility for teachers to create learning methodologies that awaken the curiosity of students through interactive content that can expand their knowledge.

5. TED-Ed

TED-Ed is an educational website that allows instructors, students, animators, and anybody else interested in spreading knowledge and good ideas to collaborate on educational sessions. This website allows teachers and students to have equal access to information. People can participate actively in the learning process of others here.

6. cK-12

cK-12 is a website dedicated to lowering the price of academic publications for the K-12 market in the United States and around the world. To accomplish this goal, this platform uses an open source interface that allows users to create and distribute educational content via the internet that can be customised and includes movies, audios, and interactive exercises. It can also be printed if it meets the editorial requirements in each region. Any teacher or student can change the books generated in cK-12 to meet their needs.

7. ClassDojo

ClassDojo is a tool to improve student behavior: teachers provide their students with instant feedback so that good disposition in class is 'rewarded' with points and

students have a more receptive attitude towards the learning process. ClassDojo provides real-time notifications to students, like 'Well Done David!' and '+1', for working collaboratively. The information that is collected about student behavior can be shared later with parents and administrators through the web.

8. eduClipper:

Teachers and students can use this platform to share and discover references and educational materials. You can use eduClipper to collect information from the internet and then share it with members of previously created groups, allowing you to better manage academic content found online, improve research methodologies, and keep a digital record of what students accomplished during the course. Similarly, it allows professors to organise a virtual class with their students and produce a portfolio that contains all of their completed work.

9. Storybird:

Storybird aims to promote writing and reading skills in students through storytelling. In this tool, teachers can create interactive and artistic books online through a simple and easy to use interface. The stories created can be embedded in blogs, sent by email, and printed, among other options. In Storybird, teachers can also create projects with students, give constant feedback, and organize classes and grades.

10. Animoto:

Animoto is a digital tool that allows you to create high-quality videos in a short time and from any mobile device, inspiring students and helping improve academic lessons. The Animoto interface is friendly and practical, allowing teachers to create audiovisual content that adapts to educational needs.

11. Kahoot:

Kahoot is an educational platform that is based on games and questions. Through this tool, teachers can create questionnaires, discussions, or surveys that complement academic lessons. The material is projected in the classroom and questions are answered by students while playing and learning at the same time. Kahoot promotes game-based learning, which increases student engagement and creates a dynamic, social, and fun educational environment.

Technological Assessment Adoption in Non-formal Education:

Padlet:

Padlet is a similar tool to Trello, but simplified. It presents more like a Pinterest

board, but without all the clutter and ads. Padlet's website describes the tool as, "Somewhere between a doc and a full-fledged website builder, Padlet empowers everyone to make the content they want, whether it's a quick bulletin board, a blog, or a portfolio".

POPPlet:

Popplet is perhaps the simplest tool to capture and organize ideas. With a few clicks on your screen you can make "Popplets" (little squares) and add text and images. It's easy to connect the Popplets, rearrange them, change their colour and even adjust their shape. Popplet is great for learning in the classroom and at home. Students use Popplet to think and learn visually. Students learn to generate new ideas by capturing facts, thoughts, and images. They learn to make simple mind maps in just a few steps.

MIRO:

MIRO is the online collaborative whiteboard platform to bring teams together, anytime, anywhere. Miro is an endless virtual whiteboard to brainstorm and write down visual projects. You can add videos from YouTube and Vimeo and Google Docs from your Google Drive to the Whiteboard. Students can collaborate on teamwork on different devices. They can add little memos and comment on them with the mini-chat.

PIAZZA:

Piazza is a free, simple Q&A conversation platform for educators and teachers to handle questions and answers in class, workshops, and training sessions. Students and participants can post questions and update responses to those questions together. Instructors, trainers, and teachers can also respond to student queries, support their responses, and edit or delete any content that has been uploaded.

Flipgrid:

Flipgrid is a simple, free, and accessible video conversation platform for educators, learners, and families from PreK to PhD. Make a topic and get your community involved...together Flipgrid is a social learning platform that engages students by allowing them to debate videos. The software enhances the web-based environment by providing new opportunities for thought, debate, demonstration, and cooperation. " Instructors build a "grid" with a topic and a short video prompt to share with the class (2.5 minutes or less). The pupils then reply by making their own films! Students can respond to other videos by making their own (90 seconds or less).

iBrainstorm:

Capturing and sharing a student's creative mind has never been easier. iBrainstorm lets them brainstorm in the most easy way. Students can write and add notes to the board. They can even invite up to three fellow students to participate in the brainstorm.

6.5 Blended Learning: Concept and Scope

ETYMOLOGICAL TERMS OF BLENDED LEARNING :

The terms "blended," "hybrid," "technology-mediated instruction," "web-enhanced instruction," and "mixed-mode instruction" are often used interchangeably in current research literature. The concept of blended learning has been around for a longtime, but its terminology was not firmly established until around the beginning of the 21stcentury.

The meaning of blended learning widely diverged to encompass a wide variety of synthesis in learning methods until 2006, when the first Handbook of Blended Learning by Bonk and Graham was published. Graham challenged the breadth and ambiguity of the term's definition, and defined 'blended learning systems' as learning systems that "combine face-to-face instruction with computer mediated instruction." Currently, use of the term blended learning mostly involves "combining Internet and digital media with established classroom forms that require the physical co- presence of teacher and students.

CONCEPT OF BLENDED LEARNING:

Blended learning is a formal education program in which a student learns at least in part through delivery of content and instruction via digital and online media with some element of student control over time, place, path or pace. Flipped classroom is a form of blended learning in which students learn content online by watching video lectures, usually at home, and homework is done in class with teachers and students discussing and solving questions. Teacher interaction with students is more personalized guidance instead of lecturing. This is also known as backwards classroom, invertedclassroom, reverse teaching, and the Thayer Method. Blended Learning is not so much an innovation as it is a natural by-product of the digital domain creeping into physical boundaries.

As digital and social media become more and more prevalent in the life of learners, it was only a matter of time before learning became .blended by necessity. That said, there's a bit more to Blended and .Hybrid learning than throwing in a little

digital learning. Blended education, Hybrid learning, flipping the classroom. Whatever one chooses to call it, this method of learning which combines classroom and online education is going places and making headlines along the way. While education experts continue to debate the efficacy of hybrid learning, its very existence has challenged them to re-evaluate not just technology's place in (and out of) the classroom, but also how to reach and teach students more effectively.

DEFINITIONS:

Friesen found that, in the early days of blended learning, the term could mean 'almost any combination of technologies, pedagogies and even job tasks'. Definitions might cover any instructional technology at all, or restrict themselves to web-based technology; they might not mention technology specifically, but instead focus on blending different theoretical approaches.

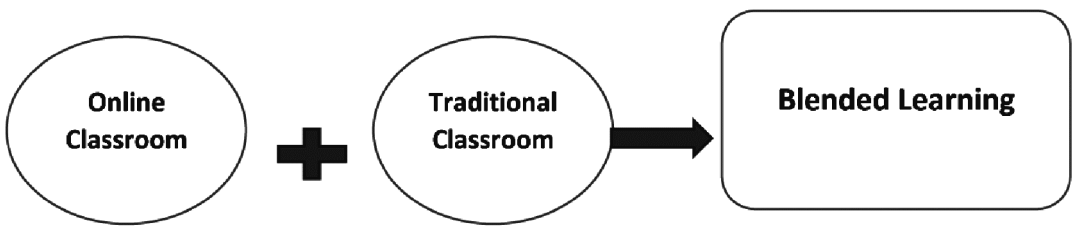
According to Oxford Dictionary *"a style of education in which students learn via electronic and online media as well as traditional face-to-face teaching".*

Procter (2003) defined blended learning as *"the effective combination of different modes of delivery, models of teaching and styles of learning"*

According to Chew, Jones and Turner, *"blended learning involves the combination of two fields of concern: education and educational technology".*

According to Graham, *"Blended learning systems combine face-to-face instruction with computer-mediated instruction".*

Krasnova, blended learning may be defined as a *"method of teaching that combines the most effective face-to-face teaching techniques and online interactive collaboration, both constituting a system that functions in constant correlation and forms a single whole".*



CHARACTERISTICS OF BLENDED LEARNING:

The main features or characteristics 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 get personal interaction with teacher and their classmates or they can choose ICT supported teaching learning. This largely depends on the nature of content and objectives being targeted. Sometime course designer or teachers themselves decide on the mode appropriate for topic being dealt with.

Teachers are well versed with both the modes:

It is an important feature of the blended learning that teachers are very dynamic, techno savvy and fully trained to work efficiently in both the formats traditional classroom format and ICT supported format. They will be well equipped in using traditional methods and other modern technologies Students get face to face interaction as well they interact in virtual space- students get ample of time to interact with other students pursuing same course. They can interact with them inside college campus and also in virtual space. Thus their group become very large and has much diversity so the student's knowledge becomes wide and they also develop a feeling of understanding, love and harmony with students of other cultures and countries.

Students get full experience in using new technology:

The present century is the century of ICT. Today the illiterate is not only the one who cannot read and write but a person who is not well versed with modern technologies is also illiterate. Today all professions demand expertise in ICT so blended learning help to make student's ICT experience rich. Students involved in blended learning gain capability to exploit available technologies to the fullest of their benefit

Students get training in different life skills:

Life skills are those skills that are needed to lead a happy peaceful and successful life. The major life skills are empathy, decision making capability, love, patience, communication, self-management, critical thinking. The blended learning helps the students to practice these skills. Students get acquainted with few skills like love, empathy, patience in classroom through his teachers, classmates, and few like self-management, decision making, critical thinking, communication through the online experiences.

All round development of personality is targeted:

In blended learning the students get full opportunity for all round development of the personality. 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. Tradition classroom teaching is helpful in memory level and understanding level of teaching and so help in cognitive domain development and at same time teacher's behaviour, playground experience and social group with classmates develop affective and physical domain at same time online experiences help in reflective level of learning so develop higher faculties of min and social networking sites and other social interactions though internet help in right type of value development.

Physical development is possible with in school campus:

The online learning and ICT supports teaching learning process is often targeted with the blame that it ignores physical development of the students. The blended learning overcomes this limitation. As it included school experience also so student get time for playing, physical work, yoga inside the college campus.

Students get wide exposure and new perspectives of the course content:

Due to variety of experience students get wide exposure and their content knowledge is enriched, they get to see various new dimensions of the content gain practical useful knowledge.

It has a human touch:

Due to physical prescience of teacher via traditional approach students get that human touch which is very necessary for balanced student's emotional quotient and very necessarily up to secondary level.

It provides multicultural and multi dimension approach to teaching learning process :

Blended learning approach provides student opportunity to communicate and share their views and feeling with the students all over the world thus it makes teaching learning process multicultural and variety of experience bring with it the interdisciplinary and multidimensional factor also. Makes teaching learning process child centered blended learning is designed to provide maximum gain to students and thus reach the goal of child centered education.

Diverse role of teacher:

Teacher in blended learning is playing different role, traditional role of a teacher in classroom, she acts as motivator, as a resource person, as an organiser, as a

developer, when she develops content to be provided through ICT, as a guide on the side. Thus teacher gets freedom from the monotonous traditional roles and she can try her hands in diverse areas that are good for her professional growth also.

SCOPE OF BLENDED LEARNING:

Below are seven sample configurations of blended learning activities, offered by O'Connell (2016). Which is given below,

Blended face-to-face class:

Also sometimes called the "face-to-face driver model," the blended face-to-face class model is based in the classroom, although a significant amount of classroom time has been replaced by online activities. Seat time is required for this model, while online activities are used to supplement the in-person classes; readings, quizzes or other assessments are done online at home. This model allows students and faculty to share more high-value instructional time because class time is used for higher-order learning activities such as discussions and group projects.

Blended online class:

Sometimes referred to as the "online driver model," this class is the inverse of the blended face-to-face class. The class is mostly conducted online, but there are some required in-person activities such as lectures or labs.

The flipped classroom:

The flipped classroom reverses the traditional class structure of listening to a lecture in class and completing homework activities at home. Students in flipped classes watch a short lecture video online and come into the classroom to complete activities such as group work, projects or other exercises. The flipped classroom model can be seen as a sub-model of the blended face-to-face or blended online class.

The rotation model:

In this model, students in a course rotate between various modalities, one of which is online learning. There are various sub-models: station rotation, lab rotation and individual rotation. Some of these sub-models are better suited to K–12 education; station rotation, for example, requires students to rotate between stations in the classroom at an instructor's discretion. Others work well on a college campus; the lab rotation model, for example, requires students in a course to rotate among locations on campus (at least one of which is an online learning lab). In the individual rotation model, a student rotates through learning modalities on a customised schedule.

The self-blend model:

While many of the blended learning models on this list are at the course level, self-blending is a programme-level model and is familiar to many college students. Learners using this model are enrolled in a school but take online courses in addition to their traditional face-to-face courses. They are not directed by a faculty member and choose which courses they will take online and which they will take in person.

The blended MOOC:

The blended MOOC is a form of flipped classroom using in-person class meetings to supplement a massive open online course. Students access MOOC materials — perhaps from another institution or instructor if the course is openly accessible — outside of class and then come to a class meeting for discussions or in-class activities. In 2012, according to Campus Technology, San Jose State University piloted a blended MOOC using MIT's Circuits and Electronics course, with students taking the MOOC out of class while face-to-face time was used for additional problem solving (LaMartina, 2012).

Flexible-mode courses:

Flexible-mode courses offer all instruction in multiple modes — in person and online — and students choose how to take their course. An example of this is San Francisco State University's hybrid flexible (HyFlex) model, which offers classroom-based and online options for all or most learning activities, allowing students the ability to choose how they will attend classes: online or in person (Beatly, 2016).

SIGNIFICANCE AND IMPORTANCE OF BLENDED LEARNING:

There are a few set of reasons as to why educational institutions adopt this approach of learning. Therefore, some of the critical significance and paramount importance of this method is as follows.

- Blended instruction is all the more efficient when in comparison with purely face-to-face or purely online classes.
- Moreover, this learning method can result in high levels of student achievement. Therefore, this is more effective than face-to-face learning.
- Further, this learning method also has the capability to reduce educational expenses. However some do dispute that blended learning is less expensive than traditional classroom learning.
- E-textbooks, which can be accessed digitally, may also help to drive down textbook budgets.

- Blended learning can lower costs by putting classrooms in the online space. It essentially replaces pricey textbooks with electronic devices that students often are more comfortable with and bring with themselves to the classes.
- This method also allows students to work at their own pace, ensuring that they fully understand new concepts before undergoing the pressure of moving on.

ADVANTAGES OF BLENDED LEARNING:

The advantages of blended learning for students include increased learning skills, greater access to information, improved satisfaction and learning outcomes, and opportunities both to learn with others and to teach others. Recent research identifies the following key benefits of blended learning:

1. **Opportunity for collaboration at a distance:** Individual students work together virtually in an intellectual endeavor as a learning practice.
2. **Increased flexibility:** Technology-enabled learning allows for learning anytime and anywhere, letting students learn without the barriers of time and location but with the possible support of in-person engagement.
3. **Increased interaction:** Blended learning offers a platform to facilitate greater interactivity between students, as well as between students and teachers.
4. **Enhanced learning:** Additional types of learning activities improve engagement and can help students achieve higher and more meaningful levels of learning.
5. **Learning to be virtual citizens:** Learners practice the ability to project themselves socially and academically in an online community of inquiry. Digital learning skills are becoming essential to be a lifelong learner, and blended courses help learners master the skills for using a variety of technologies.

DISADVANTAGES OF BLENDED LEARNING:

Following are a few disadvantage of blended learning approach of education.

- ❖ This method of learning will provide means to be a major distraction to students in the class.
- ❖ Although blended learning is proving to me a boon, it also tends to weaken the concentration of students.
- ❖ However, let's consider that students are allowed to bring their gadgets to the classroom and in fact use them. This is only one of the most liberal way of permitting students to divert from the actual concept and lessons.
- ❖ Moreover, diligent and sincere students will make the best of this method of unconventional learning. However, there are a handful of those students who

would take advantage of this. Accessing social media and something as simple as checking their messages could kill the whole purpose of this method.

- ❖ The society, the students and other institutions often frown upon a curriculum that make use of this method of learning.

6.6 Summary

In this unit we have to discuss the technological adoptions in formal education. Formal education means the structured education and training system that runs from pre-primary and primary through secondary school and on to university. It takes place, as a rule, at general or vocational educational institutions and leads to certification. Now-a-days technology helps to improvement formal education and assessment of formal education.

In this unit we have to discuss also the technological adoptions in formal education. Non-formal education refers to planned, structured programmes and processes of personal and social education for young people designed to improve a range of skills and competences, outside the formal educational curriculum. Present day huge number of students enroll in non-formal education and the assessment mode and modalities also developed.

The last one is discuss about the concept and significance of blended learning. Blended learning is the term given to the educational practice of combining digital learning tools with more traditional classroom face to face teaching. In a true blended learning environment, both the student and the teacher should be physically located in the same space.

6.7 Self-Assessment Question

1. What is Formal Education?
2. Explain the Importance of Computer Assisted Learning in Formal Education.
3. What do you mean by Non-formal education?
4. Discuss the Various Assessment tools used in Non-formal education.
5. Define the term "Blended Learning"
6. Describe the characteristics of Blended Learning.
7. Discuss the advantage and disadvantage of Blended Learning?

6.8 Reference

Aggarwal, J. C. (2009). Essentials of Educational Technology. New Delhi: Vikas Publishing House.

Kochhar, S. K. (1985). Methods and Techniques of Teaching. New Delhi: Sterling Publishers.

Mangal, S. K.(2001). Foundation of Educational Technology. Ludhiana: Tendon Publication.

Mayer, R. E. (2005). Cambridge handbook of multimedia learning. New York, NY: Cambridge University Press.

Mangal, S.K. & Mangal, U.(2016),. Essentials of Educational Technology, PHI publication, Delhi

Mohanty, J,.(2008) Educational Technology, Deep and Deep Publications PVT. LTD, New Delhi

Sampath, K., A. Panneerselvam, S. Santhanam. (2007). Introduction to Educational Technology. New Delhi: Sterling Publishers.

Shankala, D.P. (2006). Educational Technology. New Delhi: Adhyayan Publishers and Distributors.

Sharma, K. K. (2007). Educational Technology. Delhi: Mahaveer & Sons Publishers and Distributors.

Sharma, R. A. (2002). Technology of Teaching. Meerut: International Publishing House.

NOTES

NOTES