# IGNOU-M.Ed

SECOND YEAR

STUDY MATERIALS

MESE-056 :

## EDUCATION TECHNOLOGY

PREPARED BY
K.K.DEVADOSS

# National information technology policy (NITP-2000)

Recognizing the potential of IT for national development, the Government of India constituted national task force of information technology and software development in 1998. The task force prepared a report, called *IT Action Plan,* which had recommendations covering issues related to telecommunications, human resource development, Internet access, manpower training and education. The Ministry of IT was established in 1999, by the erstwhile merging Department of Telecom, Department of Electronics and Ministry of Information and Broadcasting in order to facilitate the use ofIT by converging telecommunication with information technology. Finally, on IJ:h October 2000, the *Information Technology* Act was notified

## Objectives of NITP

The main objectives ofthe national information technology policy are to:

• Enable India to emerge as an IT superpower with core competence within the next 10 years:

• Formulate *methods* to establish empowered institutions for implementing the policy;

• Remove bottlenecks to give boost to Indian IT industry and thereby give shape to the revolution in information engineering;

• To create faith in the people of the country that IT would aid and greatly enhance their efforts and vitality of individual and national growth and thereby adopt it as a post-Sf)" year national movement;

• To actively *proliferate* internet connectivity in the country and active use of c-cornrnerce:

• To enhance income, *its growth* by using IT as an enabling technology in all areas of national economy - industry, trade, and services and thereby generate • To encourage software development for earning *net* foreign exchange through software exports and *increasing quality employment* in the country;

• To support local producers and service providers by creating demand for indigenous IT products and service.

## Basic enabling technology and tools for attaining policy objectives

The basic technologies which can be used to implement the NITP relate to:

• Communication enhancement by wired, optics related and wireless telecommunication:

• Increasing capacity and performance of personal computers and networked computers;

• Universal use of microprocessors in appliances and applications;

• Development of devices and processes related to telemedicine and personal health diagnosis;

• Using intelligent appliances in home, business and schools;

• Using multimedia applications allowing for interaction with information superhighways,

• Development and use of 'smart cards', a more useful and intelligent version of today's credit cards containing microchips encoded with various classes 'of confidential information;

• Development of mobile communications which can be transformed by integration of visual and other data;

• Development of electronic note pads with voice and handwriting recognition, speech command and dictation capabilities;

• Development of e-banking, e-comrnerce, e-fund transfer, e-education;

• Building and providing necessary state-of-the-art infrastructure to software industry;

• Building access to international networks and foreign conduits for IT; and

• Developing new technical skills, managerial practices

# National telecom policy (N7P-1994)

In the year 1994 the Government of India developed the Iirvt National Telecom Policy. Which focused on developing telecommunication services in the country. The main objectives or NTP- 1994 were to:

• provide telecommunication services across the country and bring those within reach or all the citizens;

• achieve universal services covering all villages as early as possible to provide access to all people for cellular telecom services at affordable price; and

• provide quality telecom services of international standard to meet customers requirements. For more details on the policy, you can also log on to http://www.trai.gov.inffelecomPolicy_ntp94.asp

The above objectives were to be attained by the year 1997, though the resource crunch did not allow this to happen. Hence, it was decided to involve the private sector tcrfill the resource gap. This was started initially with value-added services, such as paging, and then cellular mobile phone. These days fixed telephone services in the private sector by companies like Airtel, Tata among others also provide these services. In view of the unfulfilment of the objecti ves of NTP 1994, two important changes took place. First,
there has been a growth in convergence of technologies, which means merger of two means into one. For example, while you are using your phone you can browse the internet, and watch cable TV at the same point of time - all through one cable only. Second, in the telecom, IT and media industries, the technologies have progressively been moving from wired to wireless technologies. Therefore, a need arose to frame a new telecom policy framework that could help the government to regulate services provided by private operators and also. to ensure that the operators provide facilities that meet international standard. These led to the New Telecom 'Policy, 1999.

# The new telecom policy (1999)

There was a lot of development and convergence that took place in the field of telecom, electronics and broadcasting, and therefore it was important to relook into the existing policy framework given in the year 1994. The new telecom policy framework was drafted in the year 1999, to cater for the newly arisen needs as discussed above and also to facilitate India's vision of becoming an IT superpower and to develop it with world-class telecom infrastructure in the country. According to the new telecom policy. the main objectives were to:

• ensure availability of and access to affordable and effective communication services to the people of India;

• provide a balance between the provision of universal service to all uncovered areas including the rural areas. and high-level services capable of meeting the demands of the Indian economy;

• encourage the development of telecommunication facilities in remote, hilly and tribal areas of the country;

• create a modern and efficient telecommunication infrastructure taking into account the needs of IT. media. telecom and consumer electronics and thereby propel India into becoming a superpower;

• convert PCOs wherevcrjuxtificd. into Public Teleinfo Centres with multimedia capability, remote database access including government and community information system;

• transform, in a time bound manner. the telecommunication sector into a more competitive environment in both urban and rural areas providing equal opportunities and a level playing field;

• strengthen research and development efforts in the ,country and provide an impetus to manufacturing capabilities;

• protect the defence and security interests of the country;

• enable Indian telecom companies to become truly global players; and• achieve telecom coverage of all villages in the country and provide reliable media to all by the year 2002. '

• In view of the above objectives, the NTP (1999) also set to achieve the following universal service objectives: -

• to provide voice and low speed data service to the .029 million uncovered villages by the year 2000;

• to achieve telephone-on-demand in urban and rural areas by 2000; *»:*

• to provide high speed data and multimedia capability facilities for towns with a population above 0.2 million by year 2002;

• to increase rural teledensity from the current level of 0.4 to 4.0 by the year 20 I0; and

• to achieve telecom coverage of all villages in the country by the year 2002.

Keeping in mind the importance of other services such as cellular services, paging services etc. in the telecommunication sector, the NTP( 1999) had tried to give support and promote the following.

**Cellular mobile services**

**Radio paging services**

# Broadband policy (BBP-2004)

Internet is relatively a new service that has changed the face of information technology but still it is recognized that the access to Internet is a major problem. The broadband services are being used for providing tele-education, tele-medicine, and also e-governance. In order to maintain the growth and need to provide quality service, another policy was framed in the year 2004, called Broadband Policy.

The *Broadband Po/icy-2004* has defined 'broadband connectivity' as: "An 'always-on' data connection that is able to support interactive services i'ncluding Internet access and provides the capability of the minimum download speed of 256 kilo bits per second (kbps) to an individual subscriber from the Point of Presence (POP) of the service provider intending to provide Broadband service where multiple individual broadband connections are aggregated and the subscriber is able to access these interactive services will exclude any services for which a separate licence is specifically required, for example, real-time voice transmission, to the extent it is permitted at present under ISP licence with Internet Telephony."

In order to reach to the above projected figures, the major problem, which comes in the way, is the infrastructure. The Broadband Policy Framework visualizes this critical issue and has suggested creating sufficient infrastructure through various access technologies which are being discussed as follows:

**Optical fibre technology**

The fiber optics technology can provide nearly unlimited bandwidth potential and can deliver high quality voice, data and video. It is suggested in the policy that optical fibre networks would be spread keeping in view the long-term perspective.

**Digital subscriber lines (DSL)** on copper **loop**

This technology has helped in providing Broadband services through the copper loop. Bharat Sanchar Nigam Limited (BSNL) and Mahanagar telephone Nigam Limited (MTNL) as well as other access providers are accepted to use their copper loop infrastructure for providing Broadband services through this technology. Since, MTNL and BSNL cover a wide area network to provide their telecom facilities in India. Therefore, it could be expected that Internet facility can now reach to the large number of people across the country.

**Cable TV network**

Television is one mode that reaches to most of the people in India, it can be considered as last mile infrastructure as compared to the telephone copper infrastructure. Therefore, it was suggested in the policy that a franchisee network of the service provider could be used for providing the Broadband services.

**Satellite media**

Satellite is another such medium that has a capability to reach remote and inaccessible areas. The policy intends to use this advantage through Very Small Aperture terminals (VSAT) and Direct-to-Home .(DTH) services.

**Terrestrial wireless**

According to the policy, it is suggested that in order to facilitate the penetration of Broadband and Internet, the 5.15-5.35 GHz band shall be de-licensed for the indoor use of low power Wi-Fi )),stems. For outdoor use, delicencing of the band 5.25-5.35 GHz would be considered.

# Central institute of educational technology (CIET)

**Central Institute of Educational Technology (CIET) works as an autonomous organization under the Ministry of Human Resources Development, Government of India. CIET was esrablished in 1984 with the merger of the Center of Educational Technology and Department of Teaching Aids, a constituent body of the NCERT. Its chief aim is to promote Educational Technology especially mass media singly or in combination with developed multimedia packages to extend educational opportunities and improve the quality of educational processes at the school level.**
**The following are the major functions of CIET**

**• to design, develop, tryout and disseminate alternative learning systems to achieve the national goal of universalisation of primary education, and**
**• to address various educational problems at micro and macro levels .**
**CIET performs various activities, which are as given below:**
**(i) To design and produce media software materials viz., television/radio (for both broadcast as well as non-broadcast use), films, graphics and other programmes for strengthening the transaction of curricular and co-curricular activities at school level;**
**(ii) To create competencies in development and use of educational software materials mentioned above through training in areas such as script development, media production, media communication, media research, technical operations, setting up studios, repair and maintenance**
**of equipment;**
**(iii) To train the faculty of Institutes of Advanced Study in Education/Colleges of Teacher Education**
**(IASEs/CTEs) and District Institutes of Education and Training (DIETs) in the use of educational technology in their teacher education programmes;**
**. (iv) To undertake research, evaluation and monitoring of the systems, programmes and materials**
**with a view to improving the materials and increasing their effectiveness;**
**(v) To document and disseminate information, materials and media programmes for better utilization and to function as a clearinghouse/agency in the field of educational technology; and**
**(vi) To advise and coordinate academic and technical programmes and activities of the State Institute of Educational Technology (SIETs) set up by the MHRD in various states of India.**

# State institutes of educational technology (SIET)

**The state institutes of educational technology (SIET) were set up under the centrally sponsored scheme of INSATfor education for planning and production of educational audio and video software**

**for school children and teachers of primary and secondary schools in the concerned State. SIETs**

**also produce a variety of material for the achievement of their objectives chief among which is making learning a joyful experience.**

**The main activities of SIETs are as follows:**

**• To produce educational video and audio programmes for broadcast and non-broadcast modes;**

**• To conduct television orientation programmes for teachers and scriptwriters with a view to use the medium effectively and to bridge the gap between rural and urban populations;**

**• To encourage teachers to use electronic medium for making classroom teaching effective;**

**• To conduct training programme for technical personnel and various functionaries involved in production and use of educational media programmes as well as teachers who would be using the teaching aids and material developed by SIETs;**

**• To undertake evaluation and research studies of programmes and materials;**

**• To facilitate primary schools in rural and remote areas for utilization of the programmes; and**

**• To co-ordinate with the agencies responsible for preparing curriculum for education at all levels both formal as well as informal.**

**The curriculum-based programmes are mainly produced in regional languages. However, some of**

**these programmes are produced in English, Hindi and Sanskrit. The programmes not only concentrate on school subjects like Science, Environment, Culture, Performing Arts, History, Language and Physical Education, but also emphasize value education based on the core-elements**

**incorporated in the National Policy on Education-1986. You might have noticed that the activities performed by SIETs are an extension of and provide support to CIET. Accordingly, SIETs work in co-ordination with CIET to promote joyful learning and the quality of learning.**

# Local area network (LAN)

**As per the online encyclopaedia, Wikipedia, a local area network. commonly known a~ LAN. is a computer network in which the computers are at loactions not very far from each other. It could be said that the computers in a LAN are located within a relatively much smaller area. sayan office, industrial plant, home, etc. or a small campus of an educational institution. LAN enables high speed data transmission and usually has no leased telecommunication lines. The LANs can be interconnected to get a Wide Area Network or WAN. LANs are generally based on switched Ethernet, which is a large and diverse family of frame-based computer networking technologies. But they can also use Wi-fi i.e. wire free technologies.Networking is traditionally done through wiring and may use fiber optic cables. but to lay wire free networking is getting popular. The Wi-fi system can deliver similar benefits but without the process of cumbersome wiring. In such a network, radio waves are used to send information from one point to another. It makes networking easy, less costly and imparts flexibility  There are also other advantages of this system: one tit, e capital investment is needed with lesser recurring expenditure, and it has higher bandwidth (Nair. '00 I). A wireless n~twork. without the cumbersome wiring, enhances mobility and allows its users .o share files. printers, etc. besides providing access to the Internet.**

# Metropolitan area network (MAN)

**MANs are computer networks that can cover an entire big campus or even a,n entire city. The network size falls intermediate between that of a LAN and a Wide Area Network (WAN). The various sites in a MAN could be linked by the use of optical fibres or even any wire free system. For instance, a university affiliating several colleges within a given area may be connected through MAN, which in effect connects several LANs. Such type of MANs are also called campus area network (CAN) and may in turn be connected to a WAN (http://en.wikipedia.org/wiki/ Metropolitan_area_network). It can help in exchanging information among the different parts of an educational instiution. We may take up the following case as an example of campus networking. The IIT- Kharagpur has set up a converged IP (Internet Protocol) network throughout its campus with over 4,000 access points that covers even every hostel room. It has also introduced a host of applications with the aim to make education a flexible, enriching and fulfilling experience for its students. The new multimedia-friendly network gives its thousands of students on the campus unrestricted access to the network from their rooms without the necessity of being physically present at any specific location (http://www.networkmagazineindia.com/200605/coverstory03.shtml).**

# Wide area network (WAN)

**Wide area network, commmonly known as WAN, covers a relatively larger geographical area and comprises smaller computer networks that could be connected through means such as the telephone system or leased lines or even satellites to make data accessible all over the world. Together they carry information and provide different services, such as e-rnail, chat and access to the World Wide Web. These facilities are the basic requirements of learner-centered education, that demands independent but collaborative learning with provision for continuous interaction. In WAN, the data exchange is by a standard internet protocol. Threfore, there is a growing demandfor it which has facilities for data transmission at high capacity and speed. Unlike LAN and MAN, WAN, are not generally owned by a single organization but are generally owned by either aconsortium of users or by a single network provider who sells the services to its users (Fairhurst, 2001).**

# Need for networking in education

The next question that arises is that why is networking so important today in the field of education? Let us discuss the reasons that necessitate networking in today's educational scenario. In the today's era of ICT, networking within an institution is of utmost importance not only because it is pertinent to expedite the process of sharing information and economical in terms of money and time, but also, it is a viable solution for day to day problems of routine nature. Let LIS discuss some of its benefits in the following section.

**Sharing of resources and equipment within an institution**

Networking within an institution has several advantages. Besides the scope for instant sharing of information, economy is also ensured with the sharing of material resources. For instance, a single high-speed Internet connection can be shared amongst several computers used within the institutionby the functionaries. Similarly, several computers can share an expensive printer. Since the PCs are networked, maintaining the backup is also easier.

**Scope for mixed types of connections**

Networking can be done through a combination of wired and wireless connections. This type of combination adds to the flexibility and allows the functionaries to enjoy the freedom to work at locations they choose.

**Added security through networking**

Networking of the computers used can be e,.,uipped with the facility to put information into a special code and, thus, ensure its safety through encrypting. This adds to the security of the information. The Internet connections of the different users can also be protected by a 'firewall' to safeguard against hackers and misuse of the Internet (see

**Scalability and suitability for the rising needs' of the users**

As the institution grows or the need of the users grows, the existing network can be upgraded to fulfil the added requirements

**Need of networking for wider geographical areas**

Besides having networking system in any institution, networking for wide geographical areas is vital for promoting the cause of individualized and self-paced learning. At the same time, it provides opportunity to learners to interact with their distant peers and teachers (counsellors). Now, let us consider the necessity for developing networks over wide geographical areas. Need for continuous access to information In the past, there has been a shift in the paradigm of teaching-learning processes and learners and
their learning are of prime consideration in any learning situation. Also, learning is no longer an isolated affair where teachers and learners are closeted within the four walls of the classroom with the teacher as the sole source of information. Besides, there is the need to cope up with the dynamics of a knowledge driven economy that demands life long learning. This also necessitates continuous access to information through networking. Reaching out to users at various locations Networking facilitates exchange of information amongst users who could be at different geographical locations. For instance, a well-developed network can connect schools of remote or rural areas ../
(which lack adequate teachers, libraries and other such facilities) to other institutions or a nodal agency that can provide them with these resources and thus bring about equality in educational opportunities. Scope for independent learning

Access to digitalized information through the Internet and other networks is required for independently surveying, locating, processing jlnd sharing information. The Internet provides access to the World Wide Web, which is a rich resource of information, and can be utilized for learning, conducting research, updating knowledge among others.

# Educational networking in India

Let us discuss some of the major networks in the field of education in India that arc already in existence. The prominent ones include ERNET and DELNET and some others that are in the process of being set like Indian Open Schooling Network and Sankhya Vahini project.

## Education and research network (ERNET)

Education and Research Network (ERNET) has been serving educational and research institutions in the country for almost the last two decades. This project was initiated in 19X6 as a Plan project of the Government of India under the then Department or'Electronics with support from the United Nations Development Programme (UNDP). The ERNET project was implemented with the direct participation of several Indian Institutes ofTechnology (IITs), Indian Institute of Science (IISc, Bangalore) and the National Center for Software Technology (NCST, Mumbai). The project came to an end in March 1998, but in the same year it was converted into an autonomous society under the administrative control of the erstwhile Department of Electronics.

DEL ET

DELNET (Developing Library Network) came into being in 1988. It was initially sponsored by the National Information System for Science and Technology (NISSAT), Department of Scientific and Industrial Research. Government of India and is currently being promoted jointly by the National

**Indian open schooling network (IOSN)**

Owing to the potential of the Internet as a tool for learning, the National Institute of Open Schooling (NIOS, formerly the National Open School) is proposing to develop an electronic forum as a network of schools through Internet. This forum was to be known as the' *Indian Open Schooling Network' (JOSN).* The NIOS will function as the nodal agency and will also be involved in the maintenance of the network. IOSN will, thus, bring a large number of schools with Internet facilities all over India together, thereby creating a computer grid. The primary objective of this network is to enhance the quality of teaching and learning, and to facilitate frequent communication and interaction among the member schools. The schools as well as students will have an easy access through this network to its archives and databases, academic and career counselling, internet services, online courses, etc. (see http://www.nios.ac.in/iosn.htm).

**Sankhya vahini project**

*Sankhya Vahini* is primarily a data network that was proposed by the National Taskforce on IT & Software Development, Government of India. It intends to establish a high bandwidth all-India national data network and enrich it with educational, healthcare and other knowledge-oriented multimedia. It is intended to serve as the top most national' backbone, and connect several metropolitan centers and many universities, institutions of higher learning and research centers.

**Satellite mediated networking**

Since access to quality educational facilities in the schools of rural and remote areas was lacking, it was felt that these schools should be linked by satellite to centers that can provide quality instructional programmes in a tele-rnode. Besides supporting formal education, a satellite supported network can also facilitate dissemination of information on various other aspects like health, hygiene, matters related to various occupations, etc. and thus support non-formal education. Educational programmes through satellites were successfully telecast by ISRO to about 2,400 villages in six stares for the first time in India in 1975-76 through the Satellite Instructional Television Experiment (SITE) conducted by using the American Application Technology Satellite (ATS-6). Later, with the commissioning of INSAT (Indian ational Satellite) system in 1983, a variety of educational programmes are being telecast

# Fundamental Elements of a Model of Teaching

Generally, a model of teaching consists of six elements termed as 'fundamental elements'. With the help of these elements, an outline of a model can be explained. These elements are Focus, Syntax, and Principle of reaction, Social system, Support system and Evaluation System.

**Focus: -** The term 'focus' includes the goals or objective of teaching. Every teaching activity is undertaken to achieve some defined objective to influence pupils' behaviour.

**Syntax: -** The 'Syntax' of the model explains the 'flow of activities or actions' to be followed in the model. It specifies educational environment related with the model. In other words, it describes the structure of activities or flow of phases or sequence of activities.

**Principles of Reaction: -** The principles are the guidelines for the teacher's response to the learner. Principles of reaction provide the teacher with rules of thumb by which to 'tune-in' to the student and select appropriate responses to what the students does.

**The Social System: -** It describes the inter-relationship of students and the teacher and their respective roles and the norms to be followed. In some models, the teacher is at the center. The leadership role of the teacher changes with the model. From the structural point of view, some models are very advanced; others are moderate or less advanced.

**The Support system: -** This system includes requirements in addition to human skills, capacities and technical facilities necessary to employ a model, e.g. books, cassettes, films, self-instructional system, trained expert audio-visual aids etc. The support system is structured on the basis of two sources, namely the role specification for teacher and the substantive demands of the experience.

**Evaluation System: -** Teaching is incomplete without evaluation because without it the attainment of goals cannot be assessed. Various steps and rating scales are administered to evaluate the achievement of student.

**Basic Assumption of Models of Teaching**

Models of teaching have been evolved on the following assumption.

1) Teaching is the creation of appropriate environment. There are various component parts of the teaching environment which are interdependent.

2) Content, skill, instructional roles, social relationships, types of activities, physical facilities, their uses are form an environment system. There is constant interaction among them.

3) Different combination of these elements creates different types of environments and elicits different outcomes.

4) Models of teaching create environment for class room teaching-learning process.

# CONCEPT ATTAINMENT MODELS

The concept attainment Model designed by Joyce and Weil (1972) is based on the work of Bruner and his colleagues (1956). Their main emphasis is upon the formation of categories of the complex and diverse stimuli that come from the environment and help the learner to make sense of it. The categories enable us to group together objects that have differences but can be classified together on the basis of their common characteristics. Categorizing reduces the complexity of the environment. The main object is to develop inductive reasoning.

**Syntax: -** This model has three phases. In phase one, data composed of examples and non-examples of the concept is presented to the learners.

In phase two the attainment of the concepts by learners is tested by correct identification of additional unlabelled examples, and by giving more examples of the concept. Then the teacher confirms or refutes the original hypothesis. In phase three, an analysis is made of the strategies by which the learners attain concepts.

**Principles of Reaction: -** The teacher is to be supportive to the hypotheses developed by the learners, simultaneously stressing that they are hypothetical in nature. The teacher should direct the learner's attention towards the analysis of their concepts and thinking strategies, and should support the discussion of merits and demerits of various strategies.

**Social System: -** The social system places the responsibility of identifying and verifying the concepts on the learners. The teacher tries to communicate to the learners that the solution to the problem of identifying the concept lies not within the teacher but in the data "(Examples)". He motivates the students to participate in the classroom activities. It is a cooperative joint effort between the teacher and the learners in which the interaction is very smooth.

**Support System: -** The lessons in this model require well-thought material in the form of classified examples, both positive and negative. The student's job is to learn the concept already selected by the teacher and not to invent new concepts. The students are to know the sources of data.

**Application: -** The model may be used at all age and grade levels. Studnents learn new and unfamiliar concepts with the help of this model as it teaches through the use of examples. Concepts related with any discipline or field can be taught through this model. The basic concepts of science, mathematics, social studies and languages can be most effectively taught. Teacher using this model become very effective teachers.

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# ADVANCED ORGANISER MODEL

This is Deductive Information Processing Model developed by Ausubel and is designed to teach inter-related bodies of content. This model of teaching is based on Ausubel's ideas about subject matter, cognitive structure, active reception learning and advance organizer. Ausubel believes that meaningful learning is facilitated if the concept to be learned is linked with the existing cognitive structure of the learner through a cognitive bridge. He named the 'Cognitive Bridge' as 'Advance Organizer'.

According to Ausubel, the use of Advance Organisers serves the following purposes.

- They expand the learner's cognitive structure.
- They increase his information processing ability.
- They increase his retention power.
- They help the teacher to present information.

**Syntax: -** This model has three phases. In phase one, advance organizer is presented. In phase two, the learning task or learning material is presented and in phase three the cognitive organization is strengthened. Phase three tests the relationship between the learning material and existing ideas and brings about an active learning process.

**Social System:-** The interaction between the teacher and the student is cooperative and versatile. The teacher presents the material in a meaningful sequence. He controls the intellectual structure, so that he can relate the learning material to the advance organizers and can help the students to differentiate new material from previously learned material. It is a highly structured learning situation in which the teacher presents the material in a meaningful sequence.

**Principles of Reaction: -** The teacher has to establish rapport with the learners so that the latter could express unhesitantly their confusion with the existing knowledge. The teacher clarifies the meaning of the new learning material and removes the confusion; He helps the students in promoting critical approach to knowledge. This model is suitable for face- to- face teaching.

**Support System: -** This model requires well-organized material so that integral relationship between the conceptual organizer and the rest of the material can be formed. In provides guidelines for structuring instructional material.

**Application: -** The model is useful for structure courses and to instruct students systematically in the key ideas of discipline. It can be used for teaching every subject, especially its verbal material. It increases learner's grasp of factual information. This model helps in meaningful

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# INDUCTIVE THINKING MODEL

Hilda Taba has developed Inductive Thinking Model. She is largely responsible for popularizing the term ' teaching strategy', which is designed to improve the student's ability to handle information. Her model provides the backbone of the entire social studies curriculum. The main goal of the Taba Model is the development of thinking skills in students.

**Syntax:-** The inductive thinking model has three phases: concept formation interpretation of data, application of principles or ideas. The first phase is to meet with a problem. The students must go through certain covert operations to perform the activity. Thus, the sequence of activities forms the Syntax of the teaching strategies and is presumably accompanied by underlying mental processes. The second phase is period of inquiry. The final phase is the analysis of inquiry strategy with a view to developing more effective strategies. In each case, the teacher moves the strategy along by means of eliciting questions to guide the student from one phase of activity to the next, at the appropriate time.

**Social System: -** In all the three strategies the atmosphere of the classroom is cooperative, with a good deal of pupil activity. The teacher- responses to learners for giving information and provides stimulus for summarizing inquiry. It is highly structured. However, as the students learn the strategies; they assume greater control. The teacher should encourage students to set in the process of inquiry as much as possible.

**Principles of Reaction: -** Taba offers the teacher with clear guidelines for reacting and responding within each phase. The teacher's primary mental task in the course of the strategies is to monitor how students are processing information, then to elicit questions. The important task for the teacher is to sense the student's readiness for new experience.

**Support System: - The** teacher's job is to help the student's process the data in increasingly complex ways and at the same time to develop thinking capacity.

**Application:-** The primary application of the model is to develop thinking capacity among learners. It is specifically suitable for social studies curriculum. Likewise cognitive process may be facilitated. It increases productive or creative thinking. Taba's concept formation strategy is useful for young children. It is also beneficial to students in upper classes for science and language curriculum.

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# IGNOU-M.Ed

SECOND YEAR

STUDY MATERIALS

MESE-056 :

## EDUCATION TECHNOLOGY

PREPARED BY
K.K.DEVADOSS

# Models of teaching

♣ A model of teaching is a plan or a pattern that can be used to design face-to-face teaching in classrooms or tutorial settings and to shape instructional materials, including books, films, tapes,computer-mediated programmes, and curricula (i.e. long term courses of study).

Basically,models are prescriptive teaching strategies designed to accomplish particular instructional goals.They are prescriptive in the sense that the teacher's responsibilities during the styles of planning, implementing and evaluating are clearly defined (Eggen and Kauchak, 1988).

Models differ from general strategies in the sense that models are designed to reach specific goals and make teaching more systematic and efficient. Models of teaching are really *models of learning.* As we help students acquire information,ideas, skills, values, ways of thinking and means of expressing themselves, we are also teaching them how to learn.

In fact, the most important long-term outcomes of instruction may be the students' increased capabilities to learn more easily and effectively in the future, both because of the knowledge and skills they have acquired and because they have also mastered the learning processes

## Characteristics of models of teaching

• they are plans, or guidelines, or patterns, or strategies of teaching;
• they are systematic procedures to modify the behaviour of learners;
• they specify learning outcomes or instructional goals in terms of observable and measurable student performance;
• each model of teaching is based on certain assumptions;
• they specify in definite terms the environmental conditions under which a student's response should be observed;
• they specify the criteria of acceptable performance which is expected from the students;
• they specify the mechanisms that provide for students' reaction and interaction with the environment.

# Families of models of teaching

Joyce and Weil (1992) classified models of teaching into four families based on different orientations of human beings towards their world view and the universe. They are described as follows.

## Information processing family

The models in this family share an orientation towards the information processing capabilities of the learner and also towards the environment that can be organized for himlher so as to improve his/her capacity for information processing. The models in this family emphasize ways of enhancing the human beings innate drive to make sense of the world. This can be achieved by acquiring and organizing data, sensing problems and generating solutions to them, and developing concepts and language for conveying them. In addition, some models from this family are also concerned with social relationships.

## Personal family

The models in this family focus on the individual as the source of educational growth. They pay greater attention to personal development and the processes by which the individual constructs and organizes his/her reality. In other words, this family is student-centred; and, students are taught in ways to take charge of themselves in learning and in life. These models attempt to shape education so that we come to understand ourselves better, take responsibility for our education, and learn to reach beyond our current development to become stronger, more sensitive, and more creative in our search for high-quality lives. Personal models can also be related to the development of social relations and to the individual's information processing capacity.

## Social family

The models in this family are oriented towards social relations and the relation between human beings and their culture. The range of models in this family includes those which focus more on the comparatively simple processes of organizing students to work together, and also.the more complicated models that base themselves on democratic social organization and the analysis of major social problems and critical social values and issues. When we work together we generate a collective energy that we call 'synergy'. The social models of teaching are constructed to take advantage of this phenomenon of synergy by building learning communities.

## Behavioural system family

This family attempts to build efficient environments for sequencing activities and for shaping behaviour by manipulating reinforcement. These models are based on behaviour modification, behaviour therapy, and cybernetic theories. The major emphasis of the behavioural theory is change in learners' observable behaviour. This family can be used in most educational settings and is amenable to learners of all ages.

# Fundamental elements of models of teaching

## ORIENTATION OF THE MODEL,

★Introduction:

It describes the goals and objectives of the model, the theoretical assumptions, and the principles and major concepts underlying the model. It gives description of the environment also. So, the focus constitutes the objectives of teaching and the environmental description.

★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.

## INDUCTIVE THINKING MODELS

★Introduction:

More than thirty-rive years ago, Hilda Taba was largely responsible for popularizing the term ·teaching stategy. and her work in the schools of Contra Costa (California, USA) provided a first -rate example or a teaching strategy designed to improve students' ability to handle information. In fact. her strategy formed the backbone of an entire social studies curriculum. enabling the design of courses, units of study, and lessons where the teaching thinking,was integrated with the study of content.

★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## CONCEPT ATTAINMENT MODEL

★Introduction:
★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## ADVANCE ORGANIZER MODEL

★Introduction:
The advance organizer model is designed to strengthen students' *cognitive structures,* a term Ausubel uses for a person's knowledge of a particular subject matter at any given time and *how* well organized, clear and stable it is (Ausubel, 1963). In other words, The cognitive structure has to do with what kind, of knowledge of a field is in our minds, how much of it is there, and how well it is organized.
★ two types of advance organizers - expository and comparative.
★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## INQUIRY TRAINING MODEL

★Introduction:

Inquiry training originated in a belief in the development of independent learners; its method requires active participation in scientific inquiry. Children are curious and eager to grow, and inquiry training capitalizes on their natural energetic explorations, giving them specific directions so that they explore new areas more forcefully. The general goal of inquiry training is to help students develop the intellectual discipline and skills necessary to raise questions and search out answers stemming from their curiosity.

★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## SYNECTICS MODEL

★Introduction:

creativity is important in everyday activities. Most of us associate the creative process with the development of great works of art or music, or perhaps with a clever new invention. Gordon emphasizes creativity as a part of our daily work and leisure lives. His model is designed to increase problem-solving capacity, creative expression, empathy, and insight into social relations. He also stresses that the meaning of ideas can be enhanced through creative activity by helping us see things more richly.

★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## GROUP INVESTIGATION MODEL

★Introduction:

**In** his book *Democracy and Education,* Dewey (1916) recommended that the entire school should be organized as a miniature democracy, i.e. all the democratic aspects of a society.Students participate in the development of the social system and, through experience, gradually learn how to apply the scientific method to improve the human society. This, Dewey felt, was the best preparation for citizenship in a democracy.

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★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## JURISPRUDENTIAL INQUIRY MODEL

★Introduction:

This model is based on a conception of society in which people differ in their views and priorities, and in which social values legitimately conflict with one another. Resolving complex and controversial issues within the context of a productive social order requires citizens who can talk to one another and successfully negotiate their differences. Such citizens can intelligently analyze and take a stance on public issues. The stance should reflect the concepts of *justice andhuman* dignity, the two values fundamental to a democratic society. Oliver and Shaver's image of a skillful citizen is very much that of a competent judge.

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★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## NON-DIRECTIVE TEACHING MODEL

★Introduction:

**The** non-directive teaching model focuses primarily on facilitating learning. The major goal of non-directive teaching is to assist students in attaining greater personal integration, effectiveness, and realistic self-appraisal. A related goal is to create a learning environment conducive to the process of stimulating, examining, and evaluating new perceptions. A reexamination of needs and values - their sources and outcomes - is crucial to personal integration. Students do not necessarily need to change, but the teacher's goal is to help them understand their own needs and values so that they can effectively direct their own educational decisions.

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★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

## SIMULATION MODEL (BEHAVIOURAL SYSTEMS FAMILY)

★Introduction:

Simulations have been used increasingly in education over the last 30 years, but the simulation model did not originate within the field of education. Rather, it is an application of the principles of cybernetics, a branch of psychology. Cybernetic psychologists, making an analogy between humans and machines, conceptualize the learner as a self-regulating feedback system. As a discipline, cybernetics "has been described as the com-parati ve study of the human (or biological) control mechanism, and electromechanical systems such as computers" (Smith and Smith, 1966). The central focus is the apparent similarity between the feedback control mechanisms of electromechanical system and human systems. A feedback control system incorporates three primary functions: it generates movement of the system towards a target or defined path; it compares the effects of this action with the true path and detects error; and it utilizes this error signal to redirect the system (Smith and Smith, 1966). Learning was iuderstocd to be determined by the nature of the individual, as well as by the design of the learning situation.

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★ orientation to the model
★ syntax,
★ social system,
★ principles of reaction,
★ support system,
★ application of the model,
★ instructional and nurturant effects.
★ conclusion,

Smith and Smith (1966) reported that simulations have been increasingly used in education but, the simulation model did not originate within the field of education, where learner is conceptualized as a self-regulating feedback system. Worthen (1968) proved that inductive processes increase the retention of information. Roebuck et al. (1976) reported a number of studies indicating that teachers who incorporate personal models into their repertoires increased achievement among their students.

Schrenker (1976) reported that the inquiry training resulted in greater comprehension of scientific content, stimulation of creative thinking, and skills of gathering and analysing information. El-Nernr (1979) studied the teaching of biology as inquiry in high schools and colleges. He looked at the effects on student achievement, on the development of process skills and on attitudes towards science. The experimentally oriented biology curricula achieved positive effects on all the three outcomes.
Sharan and Hertz-Lazarowitz (1980) studied effectiveness of group investigation model and reported that the more pervasive the cooperative climate, the more positive the students toward both the learning tasks and toward each other. The purpose of cooperative inquiry is to combine complex social and academic tasks to generate academic and social learning.

Hunt and Joyce (198 J) explored inductive processes with both relatively rigid and flexible students and found that flexible students made more gains in the beginning. With increased practice and training and after gaining mastery of the processes the student could carryon inductive activity independently. Voss (1982) tried inquiry training model with elementary as well as secondary level students and found it to be beneficial at both levels.

Baveja et a1. (1985) conducted a study in which concept and inductive procedures were carried out in cooperative groups. The treatment generated gains twice those of a comparison group that received intensive individual and group tutoring over the same material. Joyce et al (1989) combined cooperative learning with several other models of teaching to obtain dramatic (30 percent to 95 percent) increases in promotion rates with at-risk students. Baveja (1988) found that teaching programmes in biology which were based on the concept attainment model were more effective than the traditional program for concept learning and retention. Tennyson and Cocchiarella (1986) reported that teaching with concept attainment procedures is far more efficient for student learning than presenting students with the names of concepts, definitions and illustrations. Sharan and Shachar (1988) demonstrated the rapid acceleration of student learning when they studied and first began to use group investigation. Levin and Levin (1990) applied mnemonics model to teach 'higher order' objectives - in this case, a hierarchical system for. Classifying plants. It facilitated learning and remembering of the hierarchical scheme and also problem solving.
Passi, Singh and Sansanwal (1991) under the guidance of Bruce Joyce conducted a workshopbased study on the development of training strategy in concept attainment and inquiry training model for training application in Indian classroom conditions. Both the models brought about significant favourable changes in the attitudes of both the teacher educators and the student teachers towards the models.

# Instructional design

Inconsistent use of terminology is one of the major problems faced in the field of education, and instructional design is no exception to it. A number of other terms such as instructional development, instructional systems design, instructional design and development are used interchangeably to represent invariably the same thing. According to Reigeluth (1983), "Instructional design is concerned with understanding, improving and applying methods of '.instruction." In their survey of instructional development models, Gustafson and Branch (2002) preferred the use of instructional development to cover instructional design, and defined it in terms of five major activities: "( I) analysis of the settings and learner needs, (2) design of a set of specifications for an effective, efficient, and relevant learner environment, (3) development of all learner and management materials, (4) implementation of the resulting instruction, and (5) both formative and summative evaluation of the results of the development." The result of instructional design is a "blueprint" that prescribes what methods of instruction should be used for which students, in what context and for what course. Thus, instructional design is a *process* that can be summed up as a "systematic process of designing an instructional solution to an educational or training problem. It requires identifying causes of the problem, determining instructional objectives, and recommending or outlining instructional materials" (Rogoff, 1987). Richey (1986) says that instructional design is "the science of creating detailed specifications for the development, evaluation and maintenance of situations which facilitate the learning of both large and small units of subject matter." As such, ID is a discipline that is concerned with optimizing the process of instruction by prescribing methods and procedures to provide cost effective instruction. We can understand better by breaking the two terms used in instructional design - 'instruction' and 'design'. *Instruction* is "the deliberate arrangement of learning condition to promote the attainment of some intended goal" (Driscoll, 1994). According to Heinich et al. (l999} "Instruction is the arrangement of information and environment to facilitate learning", where environment cover place of instruction, methods, media and equipments, etc. that guide student learning.

*Design* is a creative process. Design is to create and plan for something to execute like a building plan is designed by an architect which is then implemented to erect the building. Design in instructional design is almost similar to this, where instructional designers/ teachers plan and prepare a blueprint for instruction for learning to happen. The designers of instruction must answer the following:

- when (the sequence of events that should occur);
- how (the strategies, methods and tactics should be used);
- who (are the learners; their structure and groupings); and
- what (instruments and media to be used).

Designing of instruction can be done at four levels:

*Level I: Course level* - Instructional planning is done at the highest level to specify main objectives of the course and detail out the specific lessons or units.

*Level* 2: *Lesson level* - where each lesson is planned to cover one or more objectives.

*Level* 3: *Instructional event level* - where enabling objectives are specified and detailed lesson plan for each objective is prepared covering appropriate media and methods.

*Level* 4: *Learning step level* - meaning each instructional event is planned in detail to write out some script or learning material. This is mostly the transactional level activity.

# Instructional design models

What is a model? The dictionary meaning of a model is "a description or analogy used to help visualize something (as an atom) that cannot be directly observed". The process of instructional design fits well into this meaning. Models are constructed to conceptualize and simplify abstract concepts and represent reality in simpler form. Models of instructional design have descriptive, prescriptive and/or explanatory elements in different degrees.

According to Andrews and Goodson (1980) instructional design models serve the following four purposes:
1. "Improving learning and instruction by means of the problem solving and feedback characteristics of the systematic approach.
2. Improving management of instructional design and development by means of the monitoring. and control functions of the systematic approach.
3. Improving evaluation process by means of the designated components and sequence of events, including the feedback and revision events, inherent i~ models of systematic instructional design.
4. Testing or building learning or instructional theory by means of theory-based design within a model of systematic instructional design."

Adoption of a specific instructional design model helps members of the instructional design team and the .teachers to communicate in a language understood by all. Models also provide conceptual and communication tools to manage the processes of creating quality instruction. Models guide us what to do in a step-by-step manner and inspire us to question and inquire into the validity of the claims the models make. Another important aspect that we should always remember is that instructional design models are not theories of instructional design. A model may include one or more theories of instructional design. Like the models of teaching discussed in the previous units, the instructional design models also include theories about motivation, . reinforcement, personality, creativity, etc. In this section we will describe and discuss some of the important and popular instructional design models.

# Gagne's nine steps of instruction

Robert M. Gagne in the book *The Conditions of Learning* (1965) described nine steps of instruction that can be best implemented in the 4th level of instructional design, i.e. learning steps. Gagne called these steps as instructional events. This linear model is like connecting blocks - one leading to the other. The steps are:

*1. Gain attention:* In order to help the learners learn better, it is important to gain their attention. Some of the ways to grab the attention of the learners are storytelling, demonstration, presenting a challenging problem, doing something wrongly.

*2. Inform the learner of the objectives:* Informing objectives is to let the learners know in advance what is expected of them at the end. Also, it is a cue to the instructor to tell what he/she will tell and then tell them, and again review them at the end.

*3. Stimulate recall of prior learning:* Concepts, methods, processes learnt earlier and prerequisite to learning new concepts, methods, processes should be recalled before new learning to occur. The instructor need to do this by asking questions, by stating the concepts or by simply doing a review of what has been learnt so far.

*4. Present the learning material:* Information is presented to the learner in small chunks from simple to complex sequence.

*5. Provide guidance for learning:* This step is to allow the learners to. comprehend and assimilate the materials resented. Thus, the instructor need to facilitate learning how to learn the concepts by providing guiding steps.

*6. Elicit performance:* In this step the instructor ask questions to elicit learners' understanding of the material presented.

*7. Provide reinforcement:* This is to show how the learners' performance is correct or wrong. In this stage specific feedback should be provided.

*8. Assess performance:* This step is different from step 6. Here the terminal evaluation of the achievement of objectives is done using some kind of tests.

*9. Enhancing retention and transfer:* Explaining this step, Aronson and Briggs (1983) noted: "Instructional designers cannot assume that learners will be able to transfer learning from one situation to another; such retention and transfer should be included as part of the instruction. For intellectual skills, providing spaced reviews helps. For verbal information, providing linkages between information learned at different times is recommended".

# Banathy's design of instructional systems

Under the influence of systems theory, the instructional design model of B.H. Banathy is one of the earliest models proposed in 1976. As inherent to systems, this model places a lot of importance on detailed statement of purpose that will lead to development of the system. the **ID** model proposed by Banathy, where the following steps are involved (Ledford and Sleeman, 2000):

1. Analysis and formulation of objectives: The first step is to clearly write down the purpose of the system and then outline what the learners are expected to do as a result of the instruction.
2. Prepare criterion-references tests to measure the achievement of the objectives.
3. Analysis and formulation of learning tasks: Prepare a list of learning tasks that the learners must learn to accomplish the objectives. **In** this step, the following activities are done:

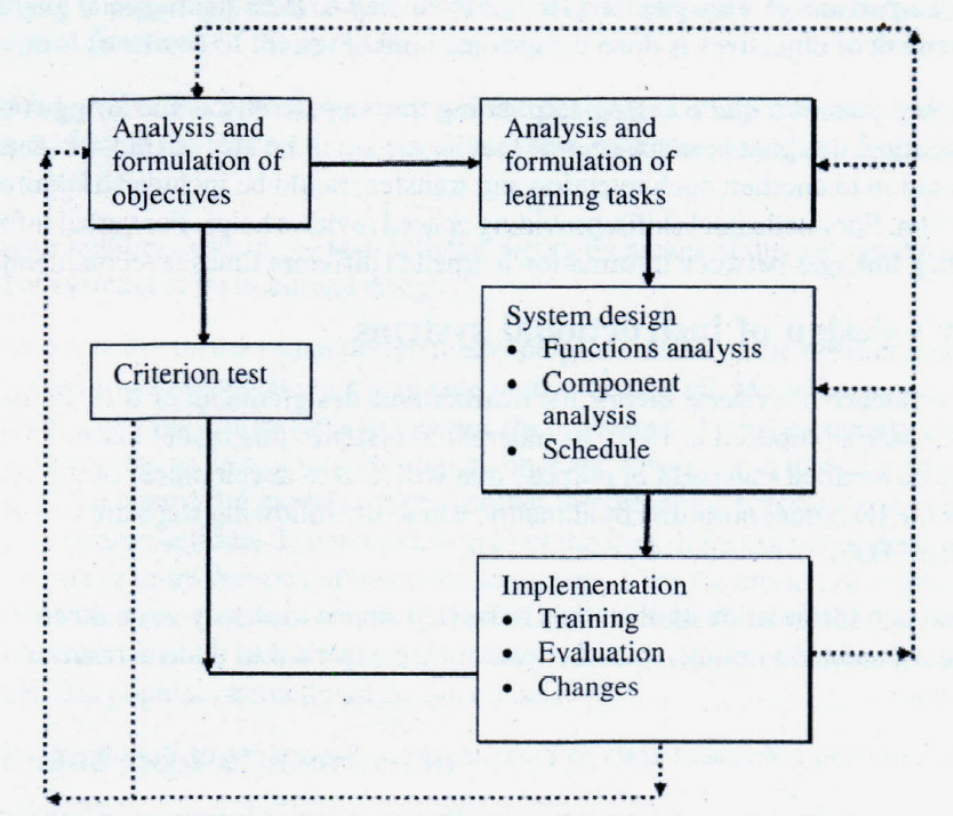
• Assess the entry behaviour through input test so that learners do not have to learn again what they already know; and
• Identify the learning tasks to be covered.

4. Design the system:

• Identify the process that will lead to mastery learning;
• Analyze how best these can be achieved; and
• At what time and place the functional training has to be conducted.

5. Implementation: This is the stage of implementation of the training and evaluating the achievement of the performance of the learners. The results of the evaluation shall determine necessary changes to be done in other components of the system.

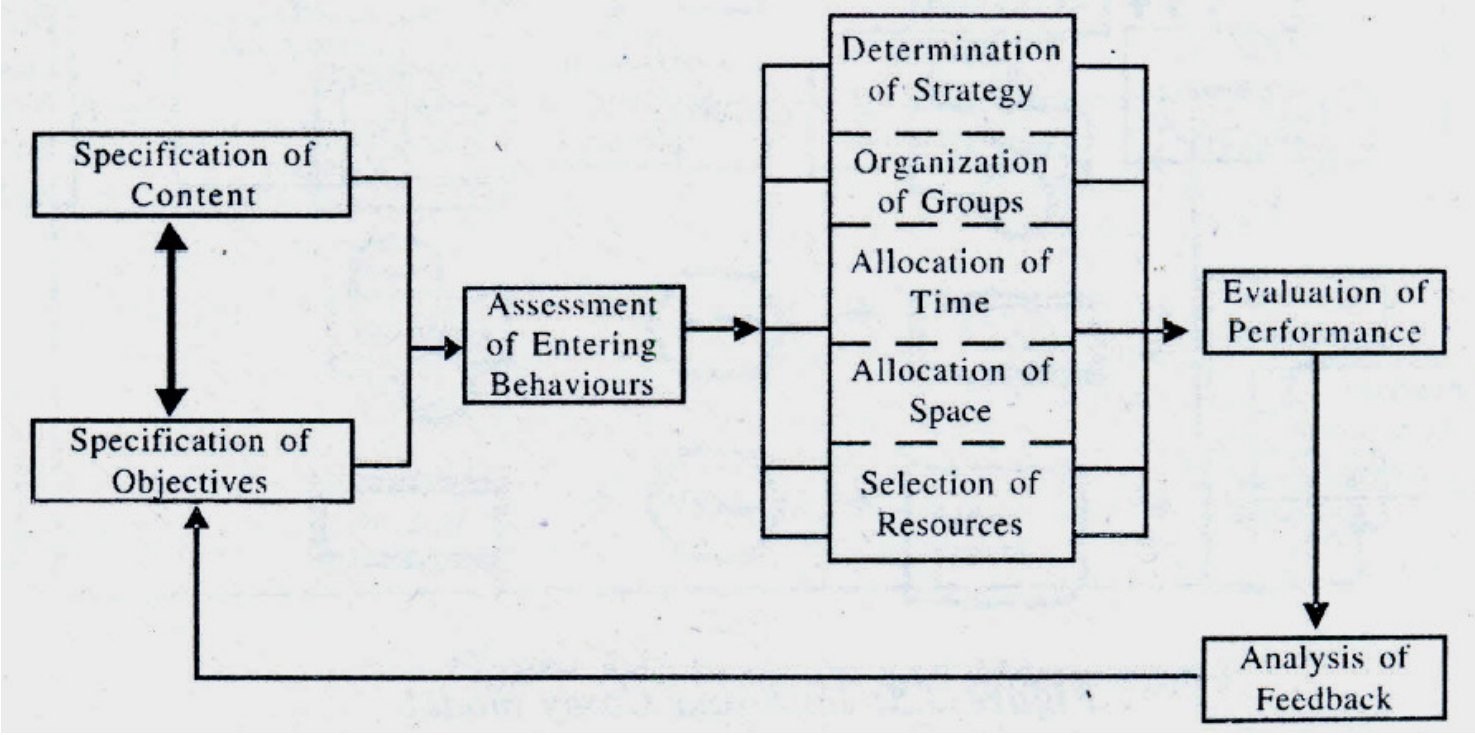
The system emphasizes clearly stated objectives, analysis of entry behaviour of the learner and testing.



# Gerlach and Ely model

Depicts the Gerlach and Ely (1971) model of instructional design that calls for identifying content and specifying objectives in the beginning as simultaneous step. This is one of the models that recognizes the content orientation of many teachers who think of content first and then specify objectives later. The next step is to assess the entry behaviour of the learners.

The following step includes five activities to be performed simultaneously. These activities are:
(i) determination of strategy, (ii) organization of groups, (iii) allocation of time, (iv) allocation of space, and (v) selection of resources. The strategy might include lecture, discussion, audiovisual presentation, written reports, etc. while organizations of groups specify how students can be organized - individually or in groups. Selection of resources focuses on the teacher's need to supplement existing instructional materials. The next step is to evaluate learner performance, followed by analysis of feedback.

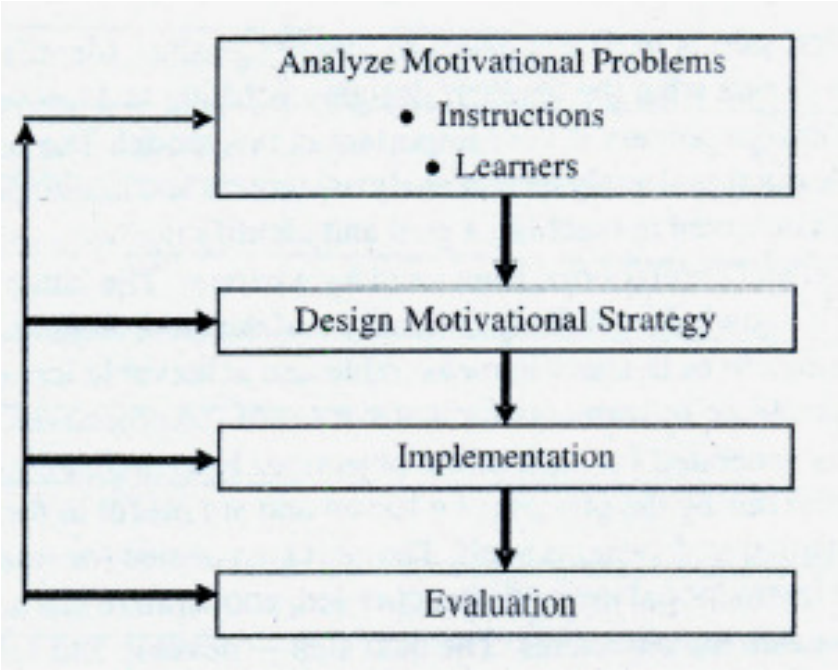


# Keller's motivational design of instruction

John M. Keller proposed that there are four basic categories of motivational conditions that instructional designers must understand. These conditions are *attention, relevance, confidence,* and *satisfaction,* often called as ARCS model (Keller, 1979). Figure 3.2 depicts the model where the first step is to analyze the motivational problem in terms of the instruction and the student. The next step is to design motivational strategies, which is followed by implementation and evaluation.

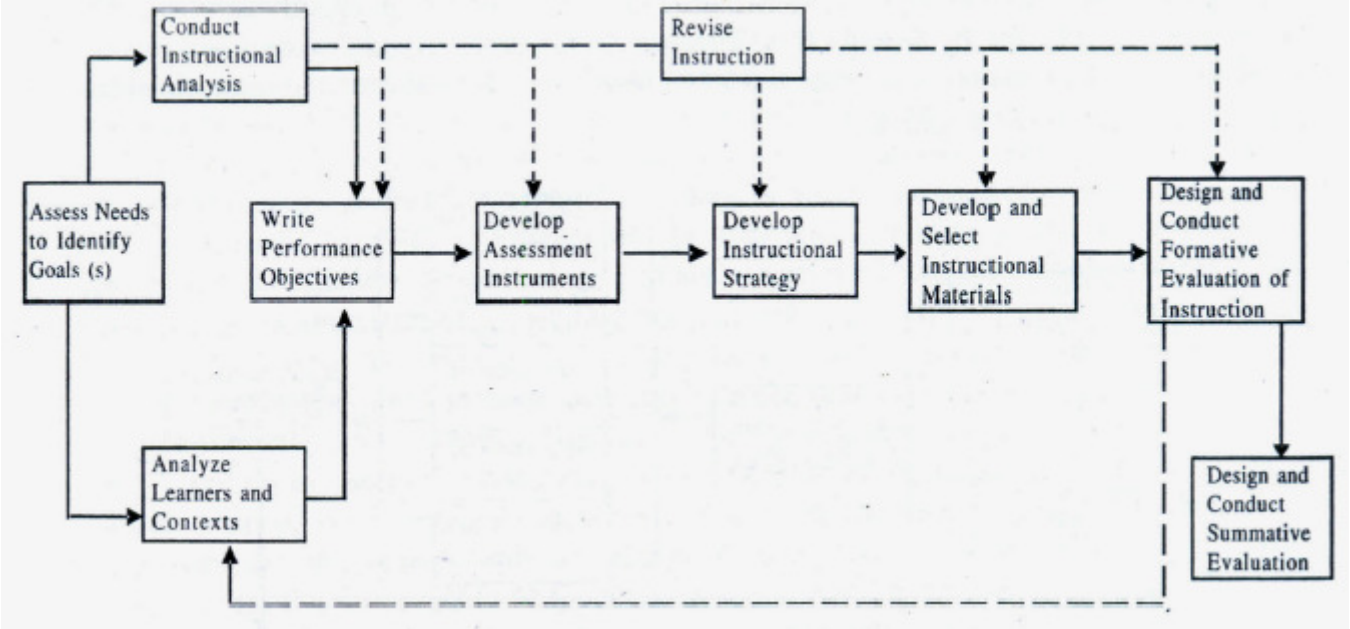
In the motivational strategy design 'attention' can be gained in two ways arousing curiosity of the learner, and using surprise or uncertainty to gain interest. Some of the strategies to gain attention include storytelling, humour, active participation, questioning, examples, analogies, etc. The second major motivational condition is that of the 'relevance'. Pupils learn more, if they think that the topic is relevant to their personal needs. In order to make instructions relevant and provide opportunity for choice and responsibility, individual's need relating to future usefulness and today's worth of learning should be assessed.

The next motivational strategy is building 'confidence'. This is to help the learners to succeed, andtherefore instruction should be provided in incremental complexity; objectives should be clearly expressed; and feedback provided to support success and develop learner confidence. The fourth motivational aspect is 'satisfaction', and instructional strategy would be to provide learners with opportunities to use the newly acquired knowledge or skill in the real world. Use of feedback and reinforcement increases intrinsic satisfaction with instruction. Other strategies should include formative evaluation and creating non-threatening learning environment.



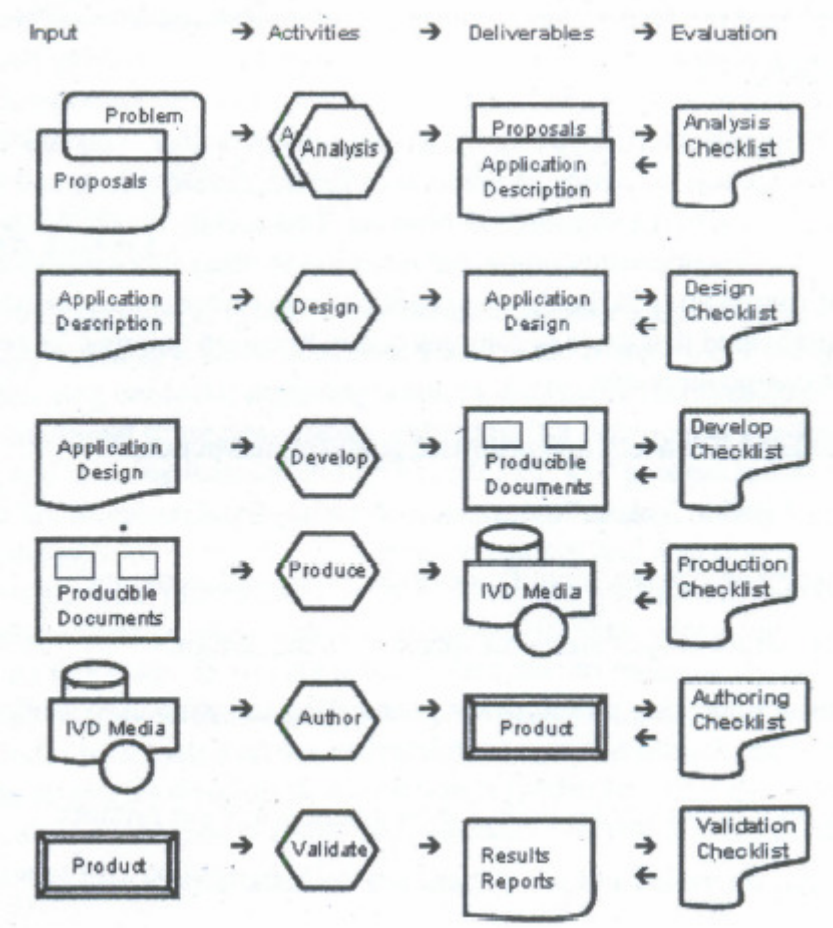
# Dick and Carey model

The Dick and Carey (1978) model is the most widely used and cited model in instructional design. This popular model is now in its fifth edition (Dick, Carey and Carey, 2001). As depicted in Figure 3.5, the first step is *to assess needs to identify goal(s).* Identification of instructional goals as a means to decide what the teacher/ designer is trying to achieve before the beginning of the instructional design process is very important in this model. The next two steps are parallel: Conduct instructional analysis and analyze learners and contexts. The former determines the skills involved in reaching a goal and identify the tasks to be performed (procedural analysis) and mental operations used by a person. The latter step determines the prospective learner's knowledge, skills, personality and the environment. The next step is to write performance objectives in specific measurable and achievable terms. This is followed by ,_ development of appropriate instruments for assessment of the objectives. The criterion referenced test items generated for each of the objectives help to diagnose individual's acquisition of learning during the process of a lesson and are useful in formative and sumrnative evaluation of the instructional systems itself. The next step named 'develop instructional strategy' is to select instructional methods (teacher-led, cooperative learning, demonstrations, discussion, etc.) to match the objectives. The next step - 'develop and select instructional materials' - emphasises appropriate choice of printed and/ or other materials to support instruction. This step also recommends identification and use of already existing materials, and development of new ones whenever required. The next step is to design and conduct formative evaluation of instruction to provide data for revision and improvement of instructional materials and the overall process of instruction. The authors recommend a variety of methods including interview and small group discussion for the purpose of formative evaluation. The 'revise instruction' step in the model is actually a supplement to the formative evaluation stage and continuously collects data during the tryout process to facilitate decision making and revision. The last step in the model is the design and conduct of summative evaluation that inquire into the effectiveness of the system as a whole and is holistic nature. This is mostly conducted at the end (after a long gap of time).



# Bergman and Moore model

Bergman and Moore (1990) proposed the 'development model' for production of interactive multimedia (See Figure 3.6). It is a systematic process that includes six major activities: analysis, design, develop, produce, author and validate. The output of each activity in the system input thus linear model, but is represented in rows and columns.
Each of the six activities can be considered as stages, and each stage has same input, activity, deliverables and evaluation. The authors recommend that the beginning of-a project requires a request far proposal (RFP). The RFP normally contains identification of the target audience, their environment, objectives to be achieved, content, etc. This is the first stage of the model where a detailed outline of the intended project is prepared which is called 'application description'. The design activities take into account issues related to' sequencing of content, objectives, detailing aut the message design and their treatment. This is essentially is a 'blueprint' and also include all media, interaction and navigation strategies, assessment methodology, etc. In the 'develop' stage, the application design is converted into specific strategies/ approaches that can be productive. The 'develop' stage will deliver multiple documents as storyboards, audio scripts, shot lists, etc. In the 'production' stage multiple media elements are actually produced, and in the 'author' stage these are integrated into one. The subactivities
in the author stage include coding, testing, and running. The validation stage consists of comparing the finished product with that of the original objectives and undertaking necessary revision,



# Gentry's IPDM model

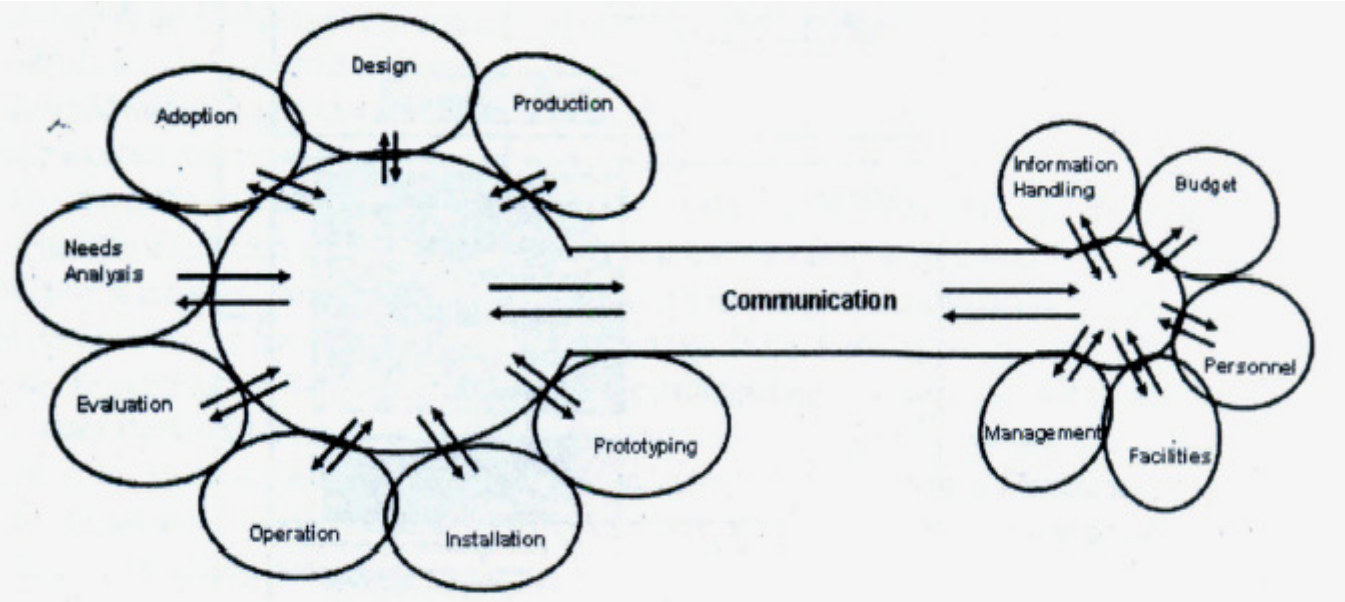
Gentry (1994) proposed the Instructional Project Development and Management (IPDM) model that is one of the most comprehensive instructional design models covering both the process and support systems for the process. As in Figure 3.7, the model has two groups of components (development and support) interlinked through a communication link. This link signifies the interaction between support activities and resources for the development, and the dependence of the instructional design to' the support components. This makes the IPDM model highly significant, though the development component is similar to many other instructional design models. The eight components in the development part can be considered sequential though Gentry (1994) recommend that there is constant communication amongst all represented by the arrows,

**The eight components are:**

1. Need analysis: Establish needs and prioritize goals for instruction.
2. Adoption: The decision makers' acceptance of the need and commitment of resources,
3. Design: To specify objectives, identify methods, media and techniques.
4. Production: Construct project elements specified in the design.
5. Prototype: Develop working prototype far pilot testing and validation leading to further production.
6. Installation: Create necessary facilities far the operation of the product.
7. Operation: Actual operation and maintenance of the installation.
8. Evaluation: Collect, analyze and summarize data far revision/updating.

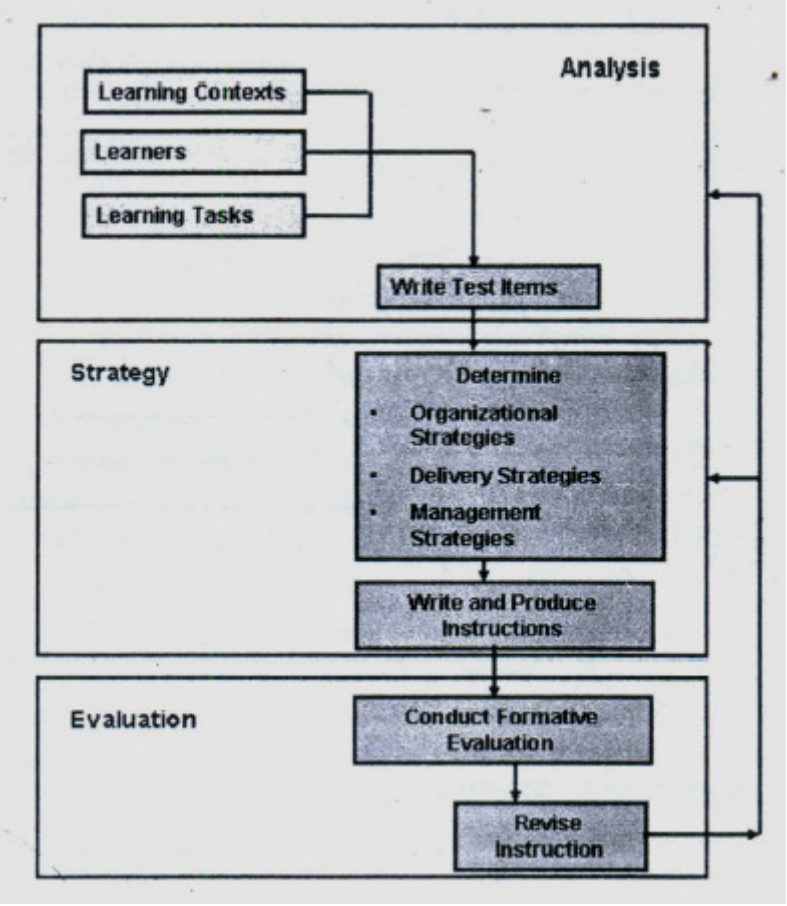
**The supporting part includes the following five components:**

1. Management: The activity that controls and coordinates the overall project.
2. Information handling: Process of selecting, collecting, generating, organizing, storing, retrieving, and distribution of information.
3. Budget: Resource allocation as per the need.
4. Personnel: Determining staffing needs, hiring, training, etc.
5. Facilities: Providing necessary space and technology for conducting the project.



# Smith and Ragan model

Smith and Ragan (1999, 2005) model is one of the most recent instructional design models. It has three phases: analysis, strategy, and evaluation. These three phases include eight steps which are: analyzing learning contexts, analyzing learners, analyzing learning tasks, writing tests items, determining instructional strategies, writing and producing instruction, conducting formative evaluation, and revising instruction (see Figure 3.8). The process is linear in nature from phase 1 to 3, but tasks inside the phase may be concurrent as well. Analysis of context involves ascertaining the need of instruction in a specific content and description of the environment where instructional product will be used. In the analysis phase, the characteristics of the learners are analyzed and learning tasks are broken down into appropriate instructional goals and objectives. At this stage, test items are also prepared to measure the achievement of the objectives of the instruction. In the second phase, instructional strategies are identified and implemented that includes how to deliver the instruction and what methods and techniques to be followed. Based on the strategies developed, instruction is produced and implemented. In the evaluation phase formative evaluation is conducted, the results of which are ploughed back into the systems for revision of instruction.



# ASSURE model

Heinich, Molenda, Russell and Smaldino (1999) presents a simple class-room model of instructionals design that is represented by the acronym ASSURE, which stands for Analyze learners State objectives Select methods, media and materials Utilize media and materials Require learner participation Evaluate and revise This model matches well into the realities of K-12 classrooms, and emphasizes careful planning The ASSURE model is similar to the Gagne's nine steps of instruction. It is a procedural guide for planning and conducting instruction in a classroom, that uses media. The first step in this model is to analyze the learners and understand their general characteristics, their entry competencies (knowledge, skills and attitudes), and learning styles. The next step is to state the objectives in measurable terms. The objectives should be stated in terms of what the learners will be able to do as a result of instruction. According to this model, a well stated objective meets four criteria, called ABCD, where

A is *Audience* for whom the objective is intended,
B is *Behaviour* to be demonstrated,
C is *Condition* under which the behaviour will be observed, and
D is *Degree* to which the new skill must be mastered .

Once the objectives are identified and stated, the next step is to select methods, media and materials to deliver the necessary content that will help achievement of the objectives. In a way, this stage is the bridge between content and objectives. In this stage, based on the need new materials are also prepared. The next stage is the actual stage of implementation, where the media and materials selected are utilized in the classroom situation. Before the actual utilization, it is important that the materials are previewed and the classroom is prepared for utilization. It is in this stage, the instructor can include some of the instructional events of Gagne. The next step is actually a concurrent activity of the previous step.

In order to have the instruction useful and effective, it requires learner participation. Instructor's use of media and materials is not sufficient alone; the learners should participate/engage in the learning process. Thus, there should be activities within the lesson to encourage participation. The instructor should provide necessary feedback on the efforts put in by the learners before formally evaluating it. The last stage in this model is evaluate and revise. This includes both assessment of the learner achievement as well as the evaluation of the whole process of instruction. The result of both helps us to revise the instructional process .

# Constructivist instructional design models

Most instructional design models discussed so far are based on learning theories from the behavioural and information processing families (Dick, 1996). However, there is a growing body of literature on instructional design from the constructivist perspectives (Winn, 1992). The literature in this genre of writings focus on constructivist learning environments (Jonassen, 1999), anchored instruction (Cognitive Technology Group at Vanderbilt, 1993), problem-based learning (Savery and Duffy, 1995), goal-based scenarios (Schank and Cleary, 1999) and situated cognition (Brown, Collins, and Duguid, 1989). Herrington and Oliver (2000) have identified nine __elements to design constructivist instructional design.

These are:
"1. Provide authentic' contexts that reflect the way the knowledge will be used in real life.
2. Provide authentic activities.
3. Provide access to expert performances and the modelling of processes.
4. Provide multiple roles and perspectives.
5. Support collaborative construction of knowledge.
6. Promote reflection to enable abstraction to be formed.
7. Promote articulation to enable tacit knowledge to be made explicit.
8. Provide coaching and scaffolding by the teacher at critical times.
9. Provide for authentic assessment for learning within the tasks." .

There are few instructional design models in the constructivist paradigm. These are layers of negotiation (Cennamo, Abell and Chung, 1996), chaos theory ID (You, 1994), and Recursive and Reflective Design and Development (Willis, 1995,2000). The Recursive and Reflective Design and Development (R2D2) model is based on three generic guidelines of constructive paradigm - Recursion, Reflection and Participation. Instead of being prescriptive, the model is suggestive and unlike other instructional design model it is non-linear in nature.

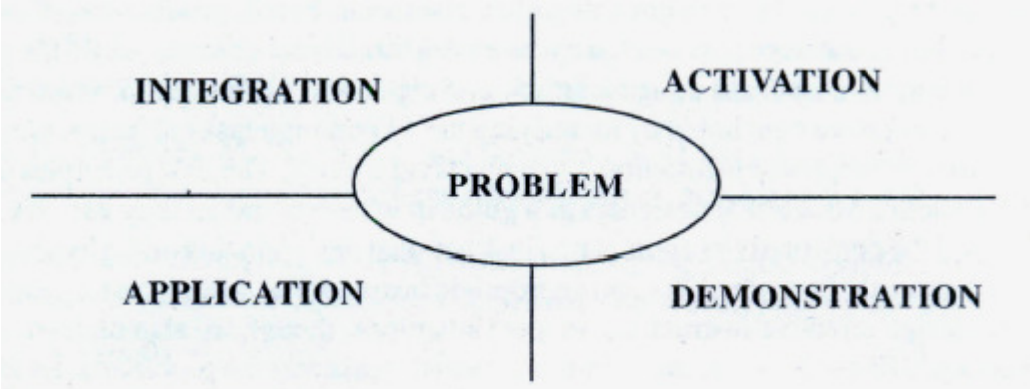
The model believes that the objectives, the context, the teaching and learning strategies emerge during the course of the design process rather than being specified precisely early in the process (Willis, 2(00). The design process is iterative. Each issue is addressed again and again in the design and development process in the specific context. The designer also uses reflective practice - reflection-in-action and reflection-on-action of Schon (1987).

Thinking about our work and what we are doing leads us to reformulate the problem! tasks in hand, Participation guideline of the model is-little difficult to implement, as it believes that the learners should be involved in the design process. But, participatory design is highly significant and useful for specialized training in technical and behavioural aspects. It improves learning due to ownership of the design by the participants. In practice, the constructivist approach can be applied in varying degrees to any of the models discussed earlier. It is up to the teacher/designer to accommodate the best of different approaches and models in his/her own practice.

# Taxonomy of ID models

The large number of instructional design models makes it practically impossible for instructional designers to use them appropriately since the unique environment of their application is less in number. Gustafson (1981) created a taxonomy of instructional design to organize the extensive literature on this topic and assist instructional designers to select best suited model to their Own situation! problem. The taxonomy has three orientations: Classroom-orientation, Productorientation, and Systems-orientation. Placement of a model in one group or other is based on the assumptions its creator or creators have made. There are also certain characteristics of a model that can also be used for classification. These characteristics are:

- Typical output in terms of amount of instruction prepared
- Resources committed to the development efforts .. Team or individual effort
- Source of most instructional materials
- Instructional design skills expected from individual or team members
- Amount of preliminary analysis conducted
- Technical complexity anticipated in the development and learning environment
- Amount of tryout and revision
- Dissemination and follow-up afterwards.



# Analysis phase

The analysis phase is the beginning of designing a training programme. The results of this phase guide us to design and develop the training, and thus work on the foundation of all subsequent activities. The analysis phase is often called as *Front-End Analysis.* It includes the following:

• Context analysis• Job analysis• Task analysis• Gap analysis• Learner analysis
• Cost analysis

## Context analysis

As a teacher involved in instructional design, you should be aware of the environment/context where training intervention is being planned. It is important to understand the internal and external customers of the client for whom you are planning training programme. Often, we suggest solutions as 'band-aid' that has little relevance to the actual working context, and thus we should understand the scope and boundaries of operations within which the training problem exist. In context analysis, we are actually interested in three aspects: the task, the trainee/ employee and the support system for training.

## Job analysis

An organization has normally many job positions. For example. a school has principal, teachers, administrative clerks, peons, etc. Each of these jobs has certain activities/tasks to perform. In most cases, you will not be asked to undertake job analysis, as 'job descriptions' are already available. Actually job description is the outcome of job analysis (refer the job analysis sheet given below). It is to dissect a job to list what the jobholder does. In order to identify the tasks involved in a job, we can do the following:

• Ask experts to list the critical tasks;
Ask employees/workers to list what they do;

## Task analysis

As mentioned earlier, a task is a function that jobholder performs, such as typing a letter. A task has a definite beginning and end; they are observable and are usually written in a way that shows a highly specific action. Thus, a task always has an action verb attached to it. The process of breaking down - task into consecutive steps or component is called task analysis. It IS done in the similar ways as that of job analysis. An example of a task analysis (sheet) is shown below. As can be seen, in the place of tasks, we have steps involved in performing the task. The total score of each step determines the priority in the training context.

## Gap analysis

This is the stage to ascertain the performance problem. The gap between desired performance and actual performance is the performance problem:

**Desired, performance,Actual, performance= A problem**

## Cost analysis

This is one of the most important analytic step in the analysis phase. Most of the time, this is not considered, as you can see in the models of instructional design discussed in the previous unit.

But, it is highly essential to consider cost of training in the beginning it self. Once we identify the training problem, we should estimate the cost involved in conducting the training. This should be as accurately analysed as possible.

# Design phase

The design phase follow the outcomes of the analysis phase. The outcomes of the design are 'training plan' and 'lesson plan'. The design phase consists of the following activities:

• Preparing training objectives • Organize training content
• Design instructional strategies • Design assessment strategies

## Preparing training objectives

Where do objectives come from? For a training programme, the objectives come from the gap analysis done at the analysis phase. The results of gap analysis tell us about the areas where training is required. However, it is important that these tasks and steps in the gap analysis are written in such a way that we are able to observe the outcomes of the training.

## Organize training content

• Order of job performance
• From simple to complex
• In terms of their critical importance
• From known to unknown
• Cause of effect relationship
• Dependence-based, where mastery of one objective requires prior mastery of another.

## Designing instructional strategies

• Lecture/presentations: Discussion: Demonstration: • Tutorials • Problem solving:
• Role play:• Case study:

## Preparing of assessment blueprint

The blueprint is also called table of specification, where we include course content/objectives of the training plan and specify their relati ve weight, and list the type of tests, type of questions, and number of questions that can be asked to cover the entire curriculum.

# Development phase

Many instructional designers and training specialists consider the 'development' phase as part of 'design' phase only; and therefore, it is also called 'design and development' phase. We have separated development for design, as we believe, development tasks are taken care of only when there is a design specification. Based on the deliverables of the design phase, the development activities start. In this phase the following tasks are undertaken:

• Preparation of presentations, handouts, etc.• Preparation of activities, tests, etc.
• Preparation of other instructional materials.• Preparation of the training site.

## Preparation of presentations

This task is usually done by individual trainers. But, many a times, the presentations prepared by different trainers are formatted uniformly by the training organizers to give a corporate and uniform task. We will discuss how you should prepare your presentation here assuming that you have access to computer and can use MS-PowerPoint. The use of PowerPoint presentations

## Preparation of activities, tests, etc.

Learner activities in a training situation include all that a trainee does during a training session to learn apart from listening to the presentation and taking notes. Even a discussion can be considered as an activity. And for that matter, role plays, case studies, and tests are all activities that the trainees do in the course of a training programme.

## Preparation of other instructional materials

Apart from your presentation for which you may have to do a little research, the training plan might also have indications of the use of a variety of learning materials such as a case study, an audio programme, a video programme, some extra reading, etc. Thus, in the development phase, we are concerned with obtaining appropriate materials for the training programme. it involves three activities: (i) selecting available materials; (ii) modifying existing materials; and (iii) designing new materials.

## Preparation of the training site

Before the training starts, you should make necessary arrangements in the place where training will be conducted. The training room should have adequate ventilation, suitable lighting, and comfortable setting. An ideal training room should have adjustable furniture, so that the sitting plan can be designed as per the needs of the group.

# Implementation phase

Any amount of planning in terms of analysis, design and development will go in vein if you as the trainer fail to implement the plan or conduct the training in the way it was originally designed. Though, you should keep scope for improvement and modification at the implementation stage, it would be better to adhere to the plan as far as possible. The implementation phase has two aspects:
(i) Administrative coordination of the training; and
(ii) actual conduct of the training sessions.

## Administrative coordination

This is primarily the responsibility of the training department and covers all necessary activities to run the training programme as a musical orchestra. Well organised training programmes have less or no problems with regard to:
• Training site, equipment failure .
• Accommodation of the participants . • Travel related difficulties.
• Communication with the participants and resource persons.
• Arrangements for refreshments and lunch breaks.
• Socialization of the participants.

## Actual conduct of the training

The actual conduct of the training depends on the quality of the trainers engaged in the activity.There are a large number of guides available on how to conduct raining sessions. But, here we would like to list few guidelines to conduct a training session:
• Introduce the topic in the best possible way so as to grab the attention of all the participants;
• Use pause effectively;
• Describe the framework of the session, its objectives, etc;
• As questions to facilitate and involve participants on the learning process;
• Use effective non-verbal communication (e.g. facial expression, body language and eye contact);
• Give appropriate feedback to the participants;
• Try to take along all the participants together;
• Use training aids appropriately;
• Help trainee to relate their new learning to work place;
• Motivate the participants by relating to real-life examples;
• Keep the session to the minimum necessary to ensure that the participants learn, rather than receive an information overhead;
• Manage time effectively so as to finish the session on time (without time over run); and give some change in presentation every 12-15 minutes.
• Summarize frequently the main points (but not to annoy the learners). Also recapitulate at the end to help participants internalize the content; and
• Be creative.

# Evaluation phase

"Evaluation is the process for gathering information about the worth or quality of something as away of making 'decisions designed to increase its worth or quality" (Newby *et 01,2000).* It is the last stage of the ADDIE model of instructional design for training. Though it is put at the end, in practice, evaluation is a continuous process that is on-going in all the other phases as well. The purpose of evaluation is primarily two fold: (i) to improve the training programme by providing the necessary feedback to the training system; and (ii) to assess the value of training to the participants and to that of the organization. On the basis of these two objectives, evaluation car: be grouped into:

*Formative evaluation:* It is concerned with identifying the weaknesses during the process of the training. They allow us to monitor the progress of the trainee and make appropriate changes to the training plan to attain the desired proficiency level. Formative evaluation is also called continuous evaluation.

*Summative evaluation:* As the term indicates, it is evaluation at the end of the training programme. Such evaluation can tell us about the worth of a training programme, through it can also indicate how we can improve the quality of the training programme and what areas can be improved upon.

# Kirkpatrick's evaluation model

Kirkpatrick (1994) has presented one of the best known evaluation models. According to him, evaluation can be conducted at four levels: reaction level, learning level, performance level, and results level. Let us discuss each of these.

## Reaction level

This is the first level of evaluation represented by the reaction or satisfaction of the participants. It is often measured with the help of an Immediate Response Questionnaire (IRQ). The results of the evaluation depict the trainee's perception of the training programme. It is the most common evaluation practice in training programmes. In order to be useful, the reaction level evaluation should ask appropriate questions, and then it is important to have clarity on what areas of the training reactions may be sought. The questionnaire may be designed in a way that limits subjectivity. Most of the time close-ended questions are asked, but open-ended questions can also be asked to supplement and validate the data supplied in the close-ended questions. As evaluator, you should also be clear about how the results of this evaluation should be used to improve the next training programme.

## Learning level

It should not be forgotten that the objective of a training programme is to improve the knowledge, skills and attitude of the trainees. In this level, we are interested in assessing – did the participant/trainee learn anything? This is often done through.a pretest-posttest or only post test of learning without, and this require development of appropriate assessment tool.

## Performance level

Kirkpatrick identified this as the 'behaviour' level, and is concerned with what changes in job behavior resulted due to participation is a training programme. Thus, it is evaluation on the job to assess the worth of a training programme. Mostly, this is done through follow-up activities after a short span of time, and involves someone like a 'supervisor' to report on the performance of the trainee prior to and after attending a training programme. This level of evaluation is an assessment of the real 'transfer of training' to the job condition.

## Results level

It is the highest level of evaluation in Kirkpatrick's model that measures the impact of the training programme in relation to the bottom line, and efficiency improvement in the organization.

# Application of expository methods ,and media

Different kinds of methods and media are used by teachers for classroom teaching. The most popular expository method is *'lecture method',* in which the major focus remains on exposing learners to facts, theories and activities. As stated above in such situations; the teachers are rnore active than learners in deciding about teaching-learning activities

The advantages of lectures and similar expository techniques can be witnessed with regard to cost-effectiveness in staff/student ratio, development of lower order cognitive and some affective objectives, popular use by teachers and students, attractive presentations etc., which influence a number of students in many respects. However, the major drawback of such a method lies on its dependence on the skills of the lecturer. Moreover, it is difficult to achieve high cognitive competencies, skills and values through this method unless it is mixed with other teaching-learning strategies. There are significant contributions of ET in making classroom teaching effective by means of effective presentation of lectures. Efforts have been made in the past to train teachers in the skills of organisation and delivery of lecture, and lecture-end assessment .of learning behaviour. A comprehensive view of skills associated with teaching has been presented in Block 1 The major focus of ET remains on systematising teaching learning practices at school stage, where the lecture method occupies a key position.

For making lectures effective, significant efforts need to be made 9Y the teacher, such as:

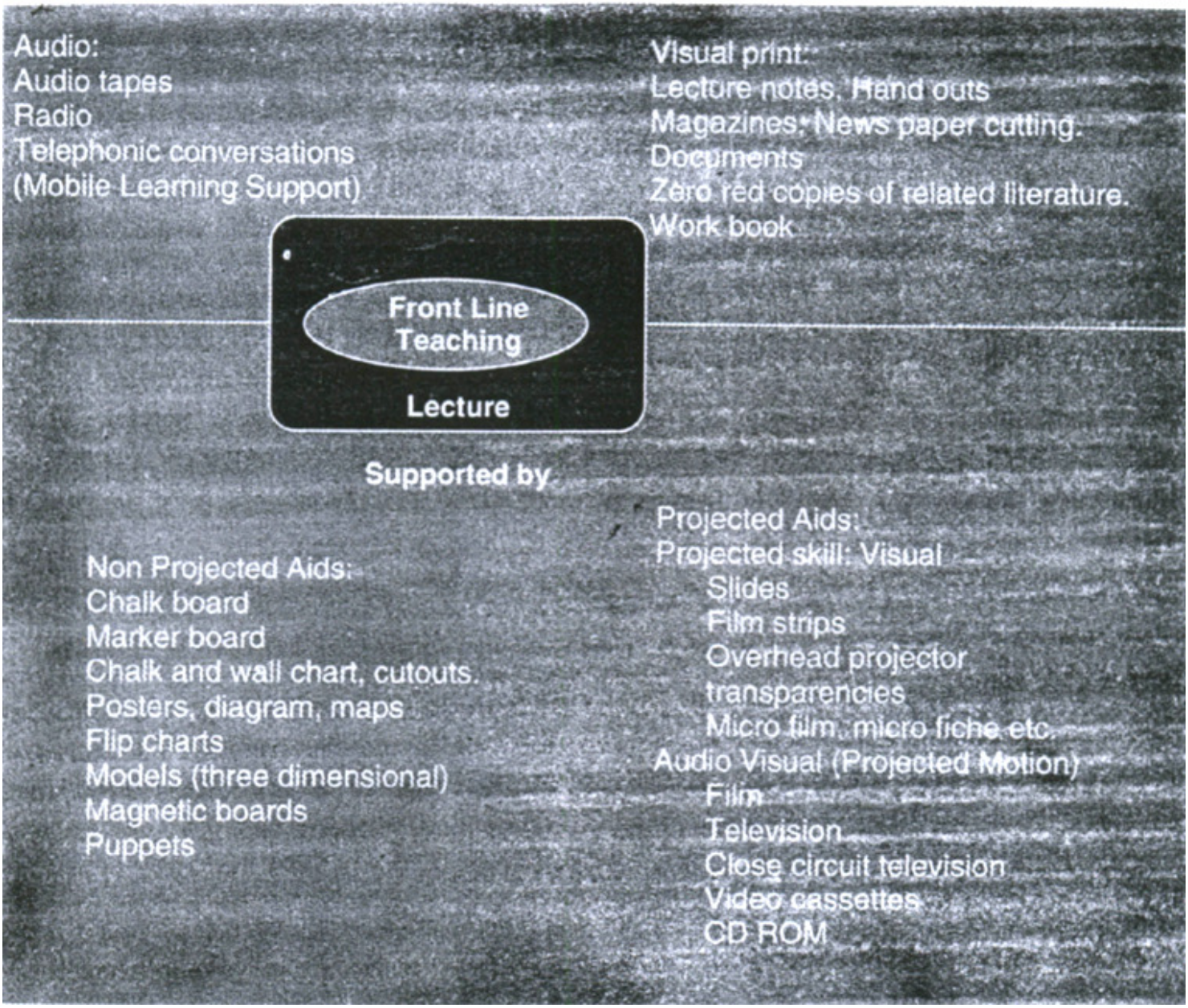
• 'to design or prepare well for lecture (i.e. *pre-active phase)* by taking cognigence of students' background; the nature of subject content; organisation of content (or content mapping); identification of instructional objectives; preparing the activities to be carried out during a lecture; and preparing lecture notes;

• to organise activities during the lecture session by adopting the skills of introduction *(i.e. interactive phase).* Following this the teacher makes presentation of the lecture by integrating different teaching skills such as explaining with illustrations and examples; making the session interactive; giving reinforcement to sustain motivation of learners; clarifying the concepts with the help of audio-visual aids; making pre -entation interestingly using appropriate gestures and postures; and assessing learners' progress during lecturing; to consolidate the presentation *(i.e. pOS'l~activephase)* by means of revie'1'ing or summarizing the lecture; by asking questions to ascertain the achievement of specified' learning outcomes; giving assignments and relating the topic to the next lecture •

As stated above, the lecture method has several limitations regarding achievement of different kinds of cognitive objectives at higher level, self involvement of learners in the teaching-learning processes, development of skills, and development of affective qualities. ET has contributed significantly to ininimise the drawbacks of lectures by adopting suitable teaching skills and audiovisual inputs. Further, integrating lecture with other activities and methods can make the teachinglearning more effective.

**Application of audio-visual media**

The practices of using various kinds of audio-visual media in classroom-based instruction at different stages of education can be witnessed over a period of the past six decades. As the name implies, an audio-visual medium can be thought of as a means through which information can reach the learners effectively.



# Application of non-projected visual aids

Non-projected aids can be used directly by the teacher without involving any optical or electronic projector. Some such aids are: chalk boards or blackboards, marker boards or white boards, magnetic boards, charts and wall charts, posters, flip charts, models and handouts.

•• The *chalk boards,* popularly known as *black boards* (available in different colours too) are widely used in different situations of formal education. The teachers need to be competent on how to make best use of chalk boards to make face-to-face teaching effective.

• The *marker boards,* often referred to as white boards are used widely. Marker board has a lot of advantages over chalk boards with regard to its smooth surface, writing and, drawing pictorials with ease, dust freeness, etc. The skills-requited for effective use of chalk board are mostly similar as those of white boards. The various forms of *charts* and *wall charts* are popular in formal education. The charts are easily handled in classroom teaching. In the case of wall chart, the charts prepared for display purposes are pinned to a wall or bulletin board! and are intended for casual reference in the context of classroom teaching. Different kinds of visuals like photographs, maps, diagrams, graphs and cartoons are generally displayed in the form of charts and wall charts.

• *Posters* are also used as impressive medium of visuals in classroom teaching. They display content in bold size letters/forms. They serve very similar purpose as served by charts, i

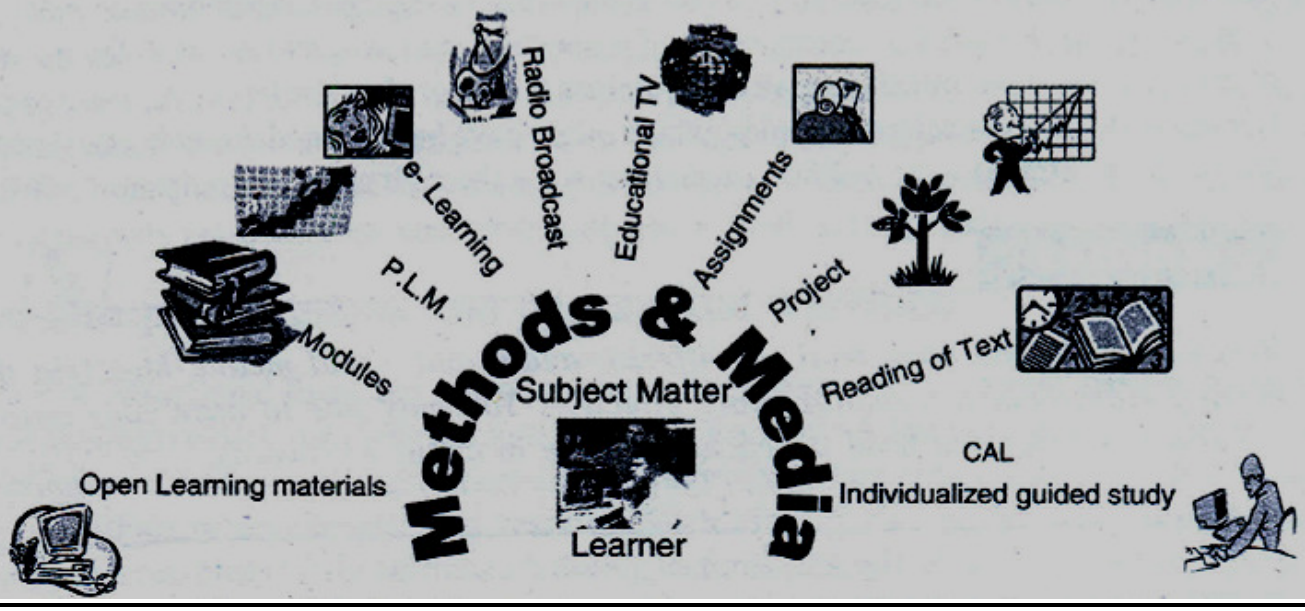
*Flip charts* are also used as effective medium for displaying learning points in the classrooms. Such charts consist of a number of large sheets of paper fixed to a support bar or display board by clamping or pinning. The charts are fixed in such a way that they can be flipped backward or forward as required by a teacher.

• You are well acquainted with the use of *models* in classroom teaching where as a teacher you may have used models of various kinds to make visual impressions more effective. Efforts can be made to incorporate effects and motions in the .models like solar system, volcanoes, etc.

• *Handouts* are popularly used in classroom teaching. These are diagrams, tables, graphs for smoothening classroom based exercises. Moreover, pre-prepared *lecture notes,* highlighting key points, are supplied to the students to make the lessons impressive. Besides the above kinds of visual aids, you may come across the use of various other forms of aids in formal education like *flannel boards, hook-and-loop .boards,* and *magnetic boards.* The details on uses of these aids are discussed in Unit 3~f this block.

## Use of self instructional methods/materials/activities

You have been exposed to a variety of approaches and methods/media used in a teacher-controlled educational system. In the past few decades there has been a tendency to encourage individualisation of learning inside such system. You may notice that in some of the progressive schools teachers accommodate a variety of self-learning materials and activities as part of their teaching-learning practices. Various kinds of self-learning exercises like: unstructured reading by the student, at home, in the classroom, or in the library; directed reading on subjects which are deemed to be relevant and important; study of self-learning materials as a complement and support to traditional teaching methods; individual projects and individualised classroom activities are incorporated as components of instructional strategies of formal school systems. While using such kinds of approaches in teaching learning, the teacher acts as a manager and a support system in the learning process (see Figure 1.3).



# ntegration of methods and media informal education