

Block**4****INSTRUCTIONAL DESIGN IN PRACTICE****UNIT 16**

Instructional Design in Classroom	95
--	-----------

UNIT 17

Instructional Design in Training	114
---	------------

UNIT 18

Instructional Design in Distance Education	131
---	------------

UNIT 19

Instructional Design in Multimedia	152
---	------------

UNIT 20

Instructional Design in e-Learning	166
---	------------



ignou
THE PEOPLE'S
UNIVERSITY

BLOCK INTRODUCTION

Dear Learner!

We welcome you to this Block 04: *Instructional Design in Practice* of Course MDE-412: Instructional Design which consists of five units.

Block 4 describes '*Instructional design in practice*'. It considers instructional strategies and models carried out in classrooms, distance teaching, training, multimedia and e-learning. A comprehensive structure for lesson planning, course design, unit design, use of ADDIE approach in multimedia and e-learning strategies, etc., are presented for providing knowledge and insight that you will use while designing instruction at various situations.

Unit 16 deals with *Instructional design in classroom*. We have presented different components of instructional process and the four levels, namely, course, lesson, instructional event and transactional. This Unit focuses on designing a unit and preparation of a lesson plan that aim to achieve a common set of goals and objectives. The major steps involved in planning a lesson are content analysis, formulation of instructional objectives, selection of instructional methods, selection of media, and selection of evaluation strategies. Implementation of the lesson plan involves three major phases: introduction/warm-up phase, development phase and closing phase have been discussed in this Unit.

In Unit 17, i.e., *Instructional design for training*, we have discussed the phases of ADDIE approach for designing training in details consisting of analysis phase and its components such as context analysis, job analysis, task analysis etc. In design phase, you will read preparing training objectives, designing assessment strategies and preparation of assessment blueprint. We have also discussed the formative and summative evaluation of training programmes. You can use the knowledge gained from this unit to design effective instruction for short-term as well as long-term training programmes.

In Unit 18, we present *instructional design in distance education*. The ideas on designing open and distance learning materials have been developed through a synthesis of elements of learning and communication theories, and an analysis of how these theories are applied in ODL environment. In this unit, we have discussed some of the useful contributions of these theories in designing instructional materials in ODL.

Unit 19 i.e., *Instructional design in multimedia* which describes various characteristics of interactive multimedia. We have presented various modes of IMM. As a student, you may be interested in developing multimedia for your courses. So, the steps involved in designing multimedia would help you to develop multimedia package. As an instructional designer, you may use the phases discussed in this unit for developing multimedia using ADDIE approach.

Unit 20 i.e., *Instructional design in e-Learning* explains how the e-Learning course needs to be designed to stimulate students to integrate and coordinate required knowledge skills and attitudes. This unit is designed to help you apply the phases of designing to the creation of e-Learning courses. The Unit begins by giving an overview of e-Learning and its features. It explains the e-Learning design process, using the ADDIE approach of instructional design which provides a systematic, step-by-step approach to designing and then improving effective and objectives-based instruction. The importance of reusable learning objects and its design process for creating e-courses are also elaborated. The unit ends with a discussion on rapid instructional design and rapid e-learning.

We hope, you will enjoy reading these units and applying this knowledge and skills of instructional design in your work. You may like to consult more literature or reading materials as suggested in the references at the end of this Block.

Good luck!!

Basanti Pradhan & Anita Priyadarshini
Course Coordinators



ignou
THE PEOPLE'S
UNIVERSITY

UNIT 16 INSTRUCTIONAL DESIGN IN CLASSROOM

Structure

- 16.1 Introduction
- 16.2 Learning Outcomes
- 16.3 Classroom Instructional Environment
- 16.4 Levels of Instructional Design
- 16.5 Analysis of Syllabus and Unit Design
- 16.6 Lesson Planning
 - 16.6.1 Content analysis
 - 16.6.2 Formulation of instructional objectives
 - 16.6.3 How to formulate instructional objectives?
 - 16.6.4 Selection of instructional methods
 - 16.6.5 Selection of media
 - 16.6.6 Media and method integration
 - 16.6.7 Evaluation strategies
- 16.7 Implementation of the Lesson Plan
- 16.8 Let Us Sum Up
- 16.9 Answers to Check Your Progress

16.1 INTRODUCTION

Human beings learn something every day. Right from birth, a human being continues to acquire many learning experiences. As you know, you too may have learnt a lot from parents, neighbours, teachers and peers in the initial period of your life. As you grow, your learning experiences get wider due to your interaction with diverse learning environments. Therefore, learning is a lifelong phenomenon. Many of these learning experiences are informal and unorganised. In an informal and unorganised learning environment, an individual interacts with the components of the environment which lead to unspecified or unanticipated learning. But there are learning environments which are purposefully created to achieve pre-decided learning objectives. These learning environments are designed and the learners interact with these environments and this leads to the achievement of pre-decided learning objectives. The process of creating or providing a controlled environment with which an individual interacts to attain certain pre-decided learning objectives is called instruction.

In this Unit, we shall discuss how instruction is designed in classroom situations. While doing so, we shall deliberate on levels of Instructional Design, an instructional design model for a classroom, unit design, lesson planning and implementation of the lesson plan.

16.2 LEARNING OUTCOMES

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

- explain the concept of classroom instructional environment;
- differentiate among the four levels of instructional design;
- enumerate the steps of analysis of a syllabus;
- design a unit for a subject;
- describe a lesson plan; and
- discuss the steps in lesson planning.

16.3 CLASSROOM INSTRUCTIONAL ENVIRONMENT

Learning experiences in educational institutions are provided to learners through specially designed and controlled instructional environment. There are many learning experiences which are provided to the learners outside the classrooms. Such learning experiences could be co-curricular in nature whereas learning experiences provided through classroom instructional environment are curricular in nature. Classroom instructional environment is generally characterized by the teacher, learners and their interaction during transaction of learning experiences that involve appropriate methods, media and assessment strategies (Figure 16.1).

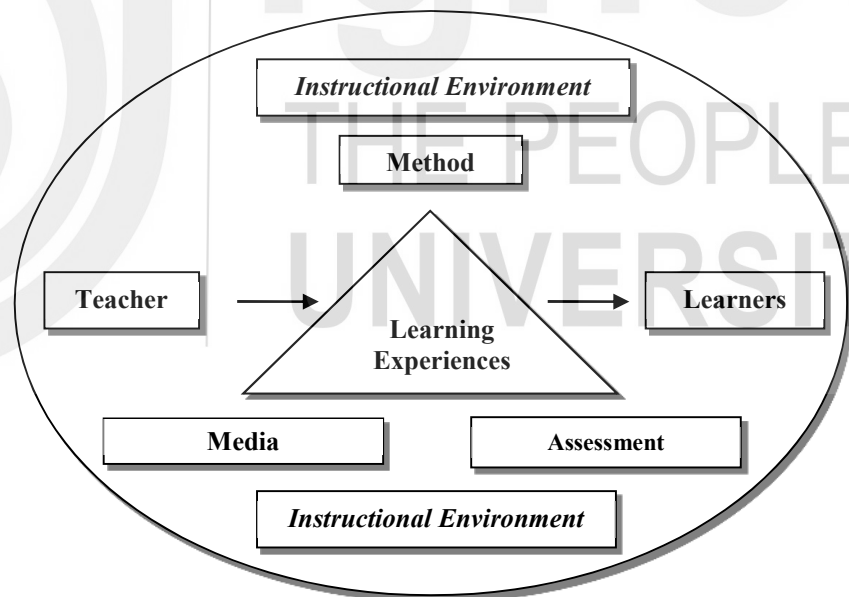


Figure 16.1: Instructional environment in a classroom

Source: IGNOU, 2000

Therefore, the various components of an instructional environment in a classroom are:

- Teacher
- Learners
- Learning experiences
- Method
- Media
- Assessment strategies

The main aim of an instructional activity is to provide learning experiences to the learners. To carry out these activities, a teacher decides instructional objectives, identifies learning experiences, transacts these learning experiences within an instructional environment and evaluates the attainment of instructional objectives or learning outcomes by the learner. The entire process of organizing instructional activities requires systematic design of the process by the teacher. Hence, instructional design is an important task that a teacher does while teaching in a classroom. Let us now look at the concept and levels of instructional design (ID).

16.4 LEVELS OF INSTRUCTIONAL DESIGN (ID)

We have discussed the meaning and purposes of instructional design in Unit five of Block two of this course (Ref. Unit 5, Block-2). Instructional Design comprises two terms: instruction and design. What is Instruction? Instruction is a human activity to help people learn. Design means to do something in a creative manner. Let us examine the following definitions of instructional design, which have implications for levels of instructional design.

- According to Rita Richey (1984), “Instructional Design can be defined as 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.”
- According to Briggs (1977), Instructional Design is the entire process of analysis of learning needs and goals. The design includes the development of instructional materials and activities, and try out and revision of all instruction and learner assessment activities.
- According to Smith and Ragan (2005), “Instructional design is defined as the systematic and reflective process of translating principles of learning and instruction into plans for instructional materials, activities, information resources, and evaluation.”

From these above definitions, it is clear that instructional design is a process of designing an instructional environment. This involves analysis of learning needs and goals, development of instructional delivery system, assessment and evaluation of learning objectives.

Instructional design starts in the beginning of the academic year when a teacher prepares the annual plan for teaching a subject. The instructional design at the pre-instructional phase involves four levels, namely:

Level 1: Course level- where Instructional planning is done 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 is designed for each objective covering appropriate media and methods.

Level 4: Transactional level – where each instructional event is planned in detail to write instructional materials. A teacher in a classroom is concerned with instructional design processes at one or more levels at any point of time.

This involves course design, preparing lesson plans teaching in a classroom and preparing instructional materials.

According to Alison A. Carr-Chellman (2015), major steps involved in designing an instructional environment in a classroom are:

- Analyze learner's needs;
- Design instruction;
- Develop instructional materials;
- Implement the instructions;
- Evaluate and revise the instruction.

The instructional design model for a classroom according to Alison A. Carr-Chellman (2015) is as follows:

1. Write instructional goals
 - a. Conduct instructional analysis
 - b. Analyze learner's need and syllabus
2. Write learning outcomes
3. Develop assessment strategies (test items)
4. Select and design instructional strategy
5. Develop and select instructional materials
6. Select appropriate media
7. Implement the plan
8. Evaluate and revise instruction

Check Your Progress 1

Notes: a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of this unit.

1. What are the various components of instructional environment in a classroom?

.....

.....

.....

.....

2. Describe the four levels of instructional design.

.....

.....

.....

.....

.....

16.5 ANALYSIS OF SYLLABUS AND UNIT DESIGN

In the beginning of the academic year, when a teacher is assigned a particular course to teach to a given target group of learners, he/she has to make a thorough analysis of the course syllabus. This group helps him/her to design the teaching-learning activities for the entire year. It involves analysis of all the units or the chapters in the course. For example, a teacher or an academic counsellor teaching tutoring and counselling communication technologies to MADE students has to analyse the entire Course of MDE-518: Educational Communication Technologies which may comprise about twenty or more units or chapters, that have to be transacted in the given academic year. You need to consider the following components while analyzing the syllabus for designing classroom instruction.

These are:

- Unit-wise content clusters to be taught;
- Competencies learners have to develop;
- Information to be acquired and skills to be developed by learners;
- Activities the learners are supposed to undertake;
- Linkage with other subjects wherever essential;
- Practical examples of applications of subject matter in daily life;
- Appropriate methods of teaching and instructional strategies;
- Appropriate teaching-learning aids for efficient teaching and learning;
- Time allocation for different units of the syllabus for instruction;
- Classroom/Counselling sessions management and techniques of lesson planning;
- Type of tests to be used for assessment of students learning outcomes.

Let us think of a classroom situation.

Teachers need to logically sequence the content and develop an inventory of the various activities they propose to undertake and plan the time they would allot to each of them. This analysis of the syllabus will provide the teachers not only with an overview of the content but also with an understanding of the goals and objectives of teaching it. A teacher can prepare a table of specifications based on the analysis of the syllabus. The table of specifications includes details of the units/content, intended learning outcomes, methods, media to be used, assessment strategies, and time allotted. The table of specifications for an analysis of the syllabus is presented in the Table 16.1.

Table 16.1: Specifications for Analysis of the Syllabus

Programme – M.A. Distance Education (MADE)

Subject – Distance Education

Course – MDE-518: Educational Communication Technologies

Objectives of the Course:

- Identify the range of educational communication technologies and their merits and demerits;
- Use educational technologies to create digital content and deliver to students using communication technologies;
- Create, engage, explore, reflect and design authentic learning at a distance.

Units	Unit Objectives	Methods and Media	Assessment Strategies	Time Allotted
Unit – 1				
Unit – 2				
Unit – 3				
Unit – 4				
Unit – 5				
Unit – 6				
Unit – 7				
Unit – N				

- **Unit designing**

Once the analysis of a syllabus is completed, the next task which a teacher is expected to do is Unit Designing. Here the teacher is supposed to carry out a thorough analysis of the content of the unit. What is content analysis? Every unit consists of a main topic that is broken up into sections and sub-sections. While analyzing the content, the teacher should select up the main concepts, sub-concepts, and propositions and reject the details. He/she should then arrange the concepts, sub-concepts and propositions under each sub-unit logically. This process of selecting various concepts and propositions in each unit and arranging them into their proper sequence is known as content analysis.

Content analysis is thus a process by which we identify various categories of content. According to Merrill (1983), the four categories of content are: facts, concepts, principles and procedures (Ref. Unit-6, Block-2). You have already studied about these categories in Component Display Theory (CDT) in Unit 6.

Let us look at this example for content analysis. For example: Newton's Law of Motion, states that every action has equal and opposite reaction. Here the concepts are related to form a rule or principle. There are four concepts in this principle. These are action, reaction equal and opposite. When these concepts are combined, they form the Newton's Law. (Source: MES-056, Educational Technology, SOE, IGNOU)

After content analysis, the teacher has to consider the goal which is a general statement as to what we expect our students to achieve. The goal may be broken up into a set of specific instructional objectives representing different learning competencies and each competency in turn may be broken up into skills. Teachers focus on specific skills and when students have acquired related skills, they achieve a competency. When pupils acquire all the competencies, they attain the goal of the unit.

Unit design involves not only content analysis but also it involves selection of appropriate techniques, methods and media for curriculum transaction. The nature of content as well as the types of objectives that are to be realized

determine the skills. Instruction involves a number of skills such as the skill of introducing the topic, the skill of explanation, the skill of illustrating with examples, the skill of questioning, and the like. Ability to select appropriate skills is one of the most important competencies the teacher needs for curriculum transaction. Unit design also involves the inclusion of assessment mechanising in the form of student assignments. Apart from the competencies we have discussed, unit design presupposes the ability to check the understanding of the students during instruction pertaining to the unit.

In other words, the unit design links together the content, objectives, techniques and methods, media and evaluation questions for realizing the goal of instruction in a particular unit.

The format of a unit design is given in Table 16.2.

Table 16.2: Unit Design

Subject/Course:		Unit:	Class:	
• Previous Knowledge/Entry behaviour of Students • Major objectives of the unit. • Overview of the theme of the unit:				
1	2	3	4	
Sub-Units	Major teaching point under each topic	Specific objectives of each teaching point	Methods and media approach adopted by teacher and pupils' activities(Learning Resources.)	
Teaching topics				
No. of session				
• Reference for pupils • Reference for teachers • Tests/Assignments/Activities				

You will notice from Table 16.2 that the unit plan deals with a section of the content that is taught on consecutive days and tested together at the end of the unit. The unit plan tells in brief what concepts are being covered, with what objectives in mind, using what techniques methods and media and how long it would take. The sample of a unit design from the Course MDE518: Educational Communication Technologies of programme M.A. in Distance Education, Course MDE-518 is presented in Table 16.3.

Table 16.3: Sample of a Unit Design

1. Course: MDE-518: Educational Communication Technologies
2. Unit: Introduction to Communication Technology
3. Target Group: Students of M.A. in Distance Education
4. Entry Behaviour of Students: Students are aware of the concept of communication due to their exposure to various communication technologies like Radio, Television and Internet

5. Major objectives of the Unit:
• Students should be able to explain the meaning, functions and process of communication. • Students should be able to explain how two-way communication takes place in open and distance education.

Communication refers to the act of, transmission, or exchange of ideas, thoughts, views, opinions and information between the sender and the receiver. In open and distance education, communication plays a significant role. This unit focuses on how distance learners and distance teachers communicate with each other using a variety of communication technology.

7. Details of the Unit Design:

Sub-Units	Major Teaching Points	Specific Objectives	Methods and Media
Communication: The Concept	1. Meaning of Communication 2. Functions of Communication 3. Process of Communication 4. Type of Communication 5. Barriers to Communication	• Students will be able to define the concept of communication. • Students will be able to describe the functions of communication. • Students will be able to describe the process of communication. • Students will be able to explain types of communication. • Students will be to describe various barriers to communication.	Methods: Lecture, Discussion, Demonstration, Brainstorming, etc. Media: Blackboard/ Whiteboard, Power point Presentation/ Audio/ Video Programme,
Educational Communication	1. Meaning of Educational Communication 2. Characteristics of an Open System 3. Distance Education as a Communication System 4. Communication in Distance Education	• Students will be able to explain the meaning of educational communication. • Students will be able to mention the characteristics of an open system. • Students will be able to explain distance education as a communication system. • Students will be able to describe the role of various communication media in distance education.	Media: Powerpoint Presentation, Audio and video programmees. Methods: Lecture, Discussion, Group work, Question-answer Question- Answer, Debate and discussion. Group work

Sub-Units	Major Teaching Points	Specific Objectives	Methods and Media
Media and Technology of Communication	1. Essential characteristics of distance education 2. Classification of communication media used in distance education 3. Merits and demerits of print medium 4. Merits and demerits non-print media	• Students will be able to mention the essential characteristics of distance education • Students will be able to classify communication media used in distance education. • Students will be able to discuss merits and limitations of print medium • Students will be able to discuss merits and demerits of non-print media.	Media: Power Point Presentation, Audio and video programmes.
Technology for People with Disabilities	1. Appropriate Technology for People with Disabilities	• Students will be able to discuss appropriate technologies for people with disabilities.	

8. References

Shannon, C.E., & Weaver, W (1949). *The Mathematical theory of Communication*, Urban: University of Illinois Press.

Rogers, Everett. M. (1986). *Communication Technology: The New Media in Society*, New York: The Free Press

Mai Bride, Sean (1980). *Many Voices, One World*, London: Kogan Page Ltd.

Tiffin, John and Rajasingham, Lalita (1995). *In Search of the Virtual Class: Education in an Information Society*, London: Routlage.

Romiszowski, J. (1988). *The Selection and Use of Instructional Media*, New York: Kogan Page

Schramm, Wilbur (1977). *Big Media, Little Media*, California: Institute for communication Research, Stanford University

9. Unit End Questions/Activities/Assignment.

- i) Explain the meaning and process of communication.
- ii) Discuss the functions of communication.
- iii) Describe the types of communication.
- iv) Explain the meaning of educational communication.
- v) Discuss the role of communication in distance education.
- vi) Classify different communication media is distance education.
- vii) Discuss the merits and demerits of print and non-print media.
- viii) Explain how technology helps students with disabilities.

16.6 LESSON PLANNING

At the time of unit plan, the content of each chapter is divided into sub-units. When we plan daily lessons, we begin by taking up the first sub-unit or a portion of it, which could be taught within a period of 35 to 40 minutes. A good lesson plan usually contains at least four sections. In the initial section, there is information about subject, class, topic, entry behaviour, general objectives of the lesson, methods and media to be used, etc. During presentation of the topic, the topic the lesson plan indicates how the content taught earlier can be revised, what has been taught on the previous day. It thus serves as a link between the present learning experiences and the past learning experiences. The presentation section involves presentation of new learning experiences in a variety of ways using different methods and media. It shows the use of communication media-print audio and visual. It reflects actions, demonstrations and a variety of drills and revision and ways for testing the new teaching points. The closing section deals with recapitulation/revision/evaluation, home assignment and blackboard work. Enough flexibility should be there to adapt it to different circumstances. The format of a lesson plan is given in Table 16.4.

Table 16.4: Format of a Lesson/Topic plan

• Subject: • Target Group: • Topic: 1. Entry behaviour 2. General objectives of the topic and formulation of specific objectives 3. Methods and Media 4. Introduction 5. Presentation			
Teaching points in sequence	Specific objective in behavioural terms	Learning experience & activities	Evaluation
6. Recapitulation/revision and evaluation 7. Home assignment 8. Blackboard work			

Check Your Progress 2

- Note:** a) Write your answer in the space given below.
b) Compare your answer with the one given at the end of this unit.

Based upon a subject of your choice, prepare a lesson/topic plan. Use the format that has been provided at Table 16.4.

.....

.....

.....

.....

16.7 STEPS IN LESSON PLANNING

You have learnt how to plan a lesson. The steps involved in planning a lesson for a classroom involves content analysis, formulation of objectives, presentation of topic, selection of methods and media integration of media with the methods and preparing assessment strategies.

Let us discuss the steps involved in planning a lesson for a classroom.

16.7.1 Content Analysis

In the instructional planning process, the first task a teacher is expected to do is to carry out content analysis. As you know, a teacher in a classroom is given the responsibility of transacting the curriculum in his/her area of study. For example, a science teacher in a classroom is supposed to transact the curriculum in science in an academic year. Each subject area contains certain content, which is generally in the form of a few chapters or units. The content of a unit comprises several concepts and propositions which a teacher teaches to his /her students. (Ref. Section 16.5)

Content analysis refers to identifying various concepts and propositions in a given content and structuring and sequencing them for the purpose of teaching and learning. Content analysis is important as it directs other activities in instructional planning like formulation of instructional objectives, selection of methods and media, organizing teaching-learning activities and carrying out assessment of student performance.

Let us explain a 'concept' with an example. For example, the concept 'fruit' has sub-concepts like apple, mango etc. There are also abstract concepts like punctuality, secularism, patriotism, etc. Hence, concepts are objects, events or any phenomena, which have common characteristics and carry a single name. In a given content, apart from concepts, there are statements which comprise more than one concept, and there is relationship between these different concepts. Such statements are called propositions. Propositions can be a principle, rule, law, theory, hypothesis, assumption, inference, etc. (Ref. Unit-6: CDT, Block-2). Read the following statements:

1. The Earth revolves around the Sun.
2. Four and four makes eight.
3. Amperes equal volts divided ohms
4. Computer-assisted learning enhances students' achievement.

All these statements are examples of proposition. The first proposition is a fact; the second proposition is a rule; the third proposition is a law and the fourth proposition is a hypothesis. In each of these propositions, you find more than one concepts form the propositions. Let us further explain with this example.

Proposition one: The Earth revolves around the Sun.

This proposition has two concepts, namely, 'Earth' and the 'Sun' that are connected by the verb 'revolve'. These concepts have a meaningful relationship with each other. Unless there is a meaningful relationship among the concepts in a statement, it cannot form a proposition.

To summarise the above discussion, the point is that content analysis is a process by which a teacher identifies various categories of content. (Ref. Section 16.5).

16.7.2 Formulation of Instructional Objectives

The next step in the process of instructional planning is to formulate instructional objectives. Instructional objectives spell out the objectives of an instructional task and provide a basis for deciding method, media, teaching-learning activities and evaluation procedures. They also specify the learning outcomes, which would accrue out of the instructional process. Instructional objectives are very important from the viewpoint of the learners as they can organize their learning activities and prepare them for assessment.

Instructional objectives which a teacher formulates for classroom instruction pertain to three domains of human abilities. These three domains are:

- Cognitive: Thinking or knowing (to know)
- Affective: Feelings (to feel)
- Psychomotor: Doing (to do)

You have studied these three domains in Unit 13, Designing learning, Block-3. (Ref. Unit 13, Block-3)

16.7.3 How to formulate instructional objectives?

Based on the content analysis, a teacher can formulate instructional objectives. Instructional objectives are formulated at two levels. The first level is general instructional objectives and the second level is specific instructional objectives. The differences between general instructional objectives and specific instructional objectives are given below:

General Instructional Objectives

- Knows a concept
- Understands a theory
- Applies a principle
(Abstract, not measurable)

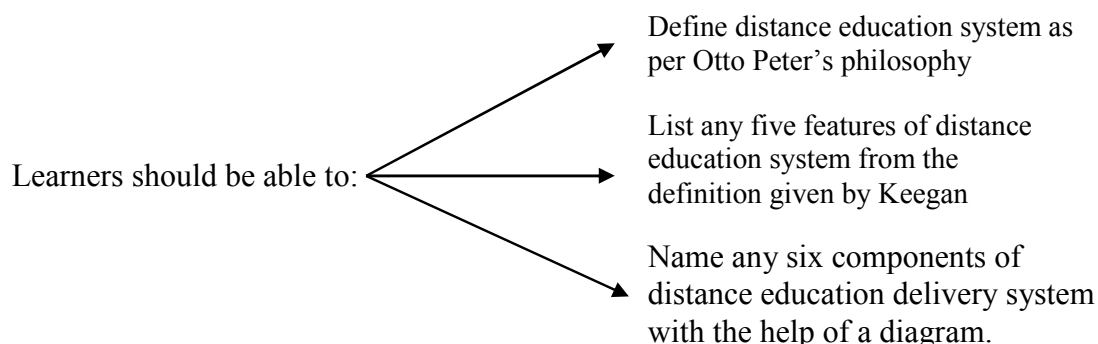
Specific Instructional Objectives

- Define a concept
- Explains a theory
- Demonstrates a principle
(Concrete, hence measurable)

Let us take a look at the following example.

General Instructional Objectives

- Learners should be able to describe the distance education system.
- Specific Instructional Objectives.



Specific Instructional Objectives

In the above examples, you observe that general instructional objectives can be divided into more than one specific instructional objective. There are four criteria which you should bear in mind while formulating specific instructional objectives. These are:

1. Audience : Learners/Students
2. Performance : List/Enumerate
3. Criterion/Standard : Any six features of distance education system
4. Conditions : From the definition given by Keegan

Now, you will be able to formulate general and specific instructional objectives for teaching different concepts and propositions. Both content analysis and instructional objectives help to decide methods and media that a teacher need to adopt to transact a particular content. Let us now discuss selection of methods and media.

16.7.4 Selection of Instructional Methods

There are various instructional methods which a teacher can use for teaching. These are lecture, demonstration, team teaching, question-answer method, project works, programmed learning, self-learning materials, computer assisted instruction, library work, laboratory work, group discussion, debate, brainstorming, panel discussion, simulation, tutorials, cooperative learning, buzz session, etc. Apart from these methods, there are also other methods like storytelling, role-play, and dramatization. Out of all these methods, a teacher has to select an appropriate method considering in keeping with the nature of the content and other aspects such as learner's characteristics, availability of resource, size of the class etc. These are:

- **Nature of the content:** The use of a method by a teacher depends upon his/her choice and competence to use that method according to the nature of the content. For example, a lecture to be delivered by a teacher for a topic introduction to communication would require a number of skills such as skill for introducing, explaining, questioning, illustrating, summarising, etc. Similarly, the use of the questioning instructional strategy requires the understanding of different forms of questioning like divergent questioning, convergent questioning, probing questioning, critical questioning, etc.
- **Learner characteristics:** Learner characteristics such as their previous knowledge, socio-economic conditions, cognitive level, urban or rural background, maturity level, interests, aptitudes, study habits, etc. influence the selection of methods.
- **Availability of resources:** The availability of resources also determines the choice of methods. For example, availability of resources like blackboard or whiteboard, maps, posters, models, internet, computer, slide projector, audio-video programmes, etc. decides the selection of a particular method.
- **Size of the class:** Size of the class determines which method is to be selected for transactioning a particular content. If the size of the class is large, then lecture method is suitable but tutorial is suitable for a small group.

16.7.5 Selection of Media

Like selection of methods, a teacher needs to select appropriate media to transact content. There are a number of media (both print and electronic) which are available for teaching. But the decision to select appropriate media depends on several factors. You can have a detailed understanding of various media available to a teacher from the Table 16.5

Table 16.5: Classification of Media

S. No.	Media type	Media details	Your suggestions
1.	Audio	• Voice • Audio programmes, to be used in a tape-recorder or language laboratory • Radio • Telephonic conversations	
2.	Visual	• Textbooks, supplementary books • Print materials • Reference books, encyclopaedia, etc. • Magazines, newspapers, etc. • Documents, clippings from published material • Photocopy of written materials (Photocopy)	
3.	Visual (non-projected, two dimensional)	• Messages/pictures on roll-up board • Flat pictures, cut-outs • Posters, charts, graphs, etc. • Cartoons, comics, etc.	
4.	Visual (non-projected three dimensional)	• Models, mock-ups, display materials • Diagrams • Globes or maps (three-dimensional) • Specimens (animate or inanimate) • Puppets	
5.	Visual (projected-still)	• Slides • Film strips ▪ Micro image system: micro film, micro card, micro fiche	
6.	Audio-visual (projected-motion)	• Film • Television • Close-circuit television • Video programmes	
7.	Multi-Media packages	• Slides + audio programme + workbook • Radio + slide or posters (Radio vision) • Film+ posters + workbook (print materials) • Any of the above+ group discussion	

S. No.	Media type	Media details	Your suggestions
		Any of the above+ introductory and summarizing talks by teacher/ leader of the group.	
8.	Multisensory media components	- Tele-conferencing (group discussion through telephones) - Cable television (localized television where feedback is possible) - Satellite television/communication satellites - Computer networking - Computers PCs/Laptops. - Mobile technology - Direct to Home Television - EduSat, SWAYAM, online platform.	

The factors which influence the decision of media selection are the following:

Factors affecting Selection of Media

- Content to be taught**

The first consideration for selection of media is the nature of the content to be taught. Content may be in the form of concepts or propositions. Propositions may be principles, facts, laws, theory, hypotheses, inferences, etc. For example, the contents of science subject may demand visual (projected still or motion) media whereas literature/ language teaching may require different audio media.

- Instructional objectives to be achieved**

For achieving instructional objectives pertaining to the cognitive domain which deals with concept formation and learning of propositions, teacher may use blackboard/whiteboard, maps, pictures, printed materials, ppt (power points) slides, television (TV), teleconferencing, computer conferencing, online videos, internet based resources etc for achieving instructional objectives pertaining to the *affective domain* which deals with development of attitudes, interest, opinion etc. film, audio/ video tape, classroom lecture, demonstration, role play, telephone teaching, computer conferencing, etc., can be selected. For achieving instructional objectives for the *psychomotor domain* which deals with development of motor skills, the teacher may select perception, guided response and adaptation, classroom demonstration model, computer simulation/ animation, online demonstrations etc.

- Learners' Characteristics**

The teacher should be aware of the learners' characteristics such as their intellectual ability, maturity level, attitudes, interests, learning style, etc., while selecting media. For example, students with visual impairment will be benefited more by audio media and other assistive devices.

- Availability and Accessibility of media**

Any educational communication technology to be selected must be available for teaching in a classroom. Suppose, a teacher of science wants to use PowerPoint slides during his/her teaching then there should be availability of computer and LCD projector in the classroom.

- **Cost of Media**

Cost or affordability of technology is an important consideration in media selection. The objectives of a given instructional task may be achieved by using different technologies which are available in the institution. But, the teacher has to take decision pertaining to the availability different media in the institution.

- **User Friendliness and Interactivity**

The user of any medium must find it easy to operate and handle the medium. In other words, media to be used should be easy to use. Interactivity means the ability of the learner to respond to the media and obtain feedback on the response.

- **Effective Communication.**

While selecting any medium, one has to consider its components to communicate the intended message or information effectively. For example, a teacher while teaching the concept of Dick and Carry model of instructional design can use an illustration consisting of all the steps of Dick and Carry model (see figure in Block-2, unit-5), so that the concept can be communicated effectively.

- **Infrastructure Facilities**

While selecting any media, the teacher has to ensure that adequate infrastructure support like table, chair, electricity supply, etc., are available in the classroom.

16.7.6 Media and Method Integration

A teacher intends to achieve several instructional objectives formulated for a topic which is to be transacted during a period of 30 to 40 minutes in a classroom. Therefore, while transacting content, the teacher can integrate different media to achieve the instructional objectives (see Table 16.5, Classification of Media).

Check Your Progress 3

Note: a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of this unit

1. Identify the steps involved in the planning of a lesson for a class.

.....

.....

.....

.....

2. What are the factors to be kept in mind for selection of media?

.....

.....

.....

.....

16.8 IMPLEMENTATION OF THE LESSON PLAN

After a lesson plan is prepared, a teacher uses it for the transaction of learning experiences in the classroom. The success of classroom instruction depends upon the effective implementation of a lesson plan for the implementation of a lesson plan. There are three major phases. These are:

- i. Introduction/warm up phase
- ii. Development phase
- iii. Closing or summing up phase

i) Introduction/Warm Up Phase

This phase prepares the students to receive the new learning experiences. Students are prepared to get engaged in the teaching-learning process. The teacher checks the entry behaviour of the students by asking a few questions or posing a problem to the students. For example, if you intend to introduce the concept of 'Distance Education', you may ask them, "what do you know about distance education? Do you have any exposure to distance education system?" You also need to relate the new topic to the topic earlier taught and capture the attention of the learner and motivate them to be attentive. You can achieve this objective with the help of the following means:

- By posing an observation apparently contrary to the common expectation
- By narrating a real life episode connected to the topic
- By performing an experiment
- By producing evidence which questions the previous understanding of an epoch, a practice, a phenomenon, etc.
- By posing a problem based on the previous knowledge of the students which require further information for them to solve it and that will be provided through the teaching-learning process.

ii) Development Phase

This phase constitutes the main part of the implementation of the plan. A teacher sequences the content of the topic into certain teaching points which are associated with relevant teacher activities and learner activities. Moreover, the teacher builds into her teaching activities formative evaluation in the form of assessment question after a section of the topic is presented. The teacher uses communication using to communicate the message. The teacher at this phase uses of a number of pedagogic skills. These are skills of using analogies, illustration, explaining, use of approximate body language, use of questions of different kinds – probing, open-ended, divergent and convergent, incorporating anecdotes and stories, varying the stimuli, use of humour and other skills.

iii) Closing or Summing up phase

Effective implementation of a lesson plan involves an effective closing or summing-up of the lesson. After the end of the development phase, the teacher needs to summarise the lesson by recapitulating major teaching-learning points covered in the lesson. This can be done by writing them on

the chalkboard or presenting them through slides. The teacher needs to ensure that the objectives of the teaching have been achieved. The present topic may also be related to the next topic to be taught in the immediate future. The teacher also gives students assignments based on the teaching points covered. The assignments could be a project, exercises and so on.

Check Your Progress 4

Note: a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of this unit

Describe the major phases for implementation of a lesson plan in a classroom.

.....

.....

.....

.....

.....

.....

.....

.....

16.9 LET US SUM UP

The main focus of this unit is on designing classroom instruction. Design of classroom activities constitutes an important component of the instructional process. Instructional design involves four levels, namely, course, lesson instructional event and transactional level. Course design involves designing of units which will be transacted during the course of an academic session. Unit design is an integrated plan for instruction which is to be imparted for a period comprising several days. It includes several lessons that aim to achieve a common set of goals and objectives. The major steps involved in planning a lesson are content analysis, formulation of instructional objectives, selection of instructional methods, selection of media, and selection of evaluation strategies. Implementation of the lesson plan involves three major phases; introduction/warm-up phase, development phase and closing phase.

16.10 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress 1

1. Different components of instructional environment in a classroom are: teacher, learners, learning experiences, method, media, and assessment strategies. (Please see section 16.3.)
2. The four levels of instructional design are: Course level, lesson level, instructional event level and transactions level. (Please see section 16.4)

Check Your Progress 2

Please use the format of a lesson or topic plan provided in Table 16.4

Check Your Progress 3

1. Please see section 16.6 for identifying the steps involved in planning a lesson for a classroom.
2. The factors for deciding selection of media include contents, to be taught, instructional objectives to be achieved, learners characteristics, availability and accessibility of learning resources, cost of the media, user friendliness and interactivity, effective communication, infrastructure and facilities.

Check Your Progress 4

The major phases for implementation of a lesson plan in a classroom are: introduction/warm up phase, development phase and closing or summing up phase. (Please see section 16.8)



UNIT 17 INSTRUCTIONAL DESIGN IN TRAINING*

Structure

- 17.1 Introduction
- 17.2 Learning Outcomes
- 17.3 Concept of Training and Phases of Designing Training Programmes
- 17.4 Analysis Phases
 - 17.4.1 Context Analysis
 - 17.4.2 Job Analysis
 - 17.4.3 Task Analysis
 - 17.4.4 Gap Analysis
 - 17.4.5 Cost Analysis
 - 17.4.6 Trainee Analysis
- 17.5 Design Phase
 - 17.5.1 Preparing Training Objectives
 - 17.5.2 Organising Training Content
 - 17.5.3 Designing Instructional Strategies
 - 17.5.4 Selecting Training Methods and Media
 - 17.5.5 Designing Assessment Strategies
 - 17.5.6 Course Description: Training Plan, Lesson Plans
- 17.6 Development Phase
 - 17.6.1 Preparation of Presentation
 - 17.6.2 Preparation of Activities, Tests, etc.
 - 17.6.3 Preparation of Instructional Materials
 - 17.6.4 Preparation of the Training Site
- 17.7 Implementation Phase
 - 17.7.1 Administrative Coordination
 - 17.7.2 Conduct of Training
- 17.8 Evaluation Phase
- 17.9 Let Us Sum Up
- 17.10 Check Your Progress: Possible Answers

17.1 INTRODUCTION

In the previous unit 16, we have discussed instructional design in classrooms. The major steps involved in designing classroom activities are content analysis, formulation of instructional objectives, and selection of instructional methods, media and evaluation strategies. In this unit, we will discuss the

processes involved in instructional design for training programmes. We consider training as a systematic activity that is organized to enhance performance of students, employees and trainees. The ADDIE approach (see Unit 11, Block 3) to instructional design is used in this unit for designing training programmes. You can use the ADDIE approach to design effective instruction for short-term as well as long-term training programmes. In this unit, we will discuss the five stages of instructional design for training. It is expected that you undertake the activities given in this unit to develop a better understanding of the instructional design process in training.

17.2 LEARNING OUTCOMES

This unit will help you to:

- discuss the concept of training and the phases of instructional design for training;
- describe the analysis phase of training;
- explain the design phase of training;
- explain the development phase of training;
- explain the implementation phase of training; and
- explain the evaluation phase of training.

17.3 CONCEPT OF TRAINING AND PHASES OF DESIGNING TRAINING PROGRAMMES

We know that ‘Education’ is a process of transmission of knowledge, concepts and ideas. It is through this process that, when educated, we become more knowledgeable about certain aspects of the instructional environment. Thus, education by and large is a long-term process. Training, on the other hand, is relatively a short-term process concerned with doing a specific job or task and applying knowledge and developing skills. Training is also related to developing and upgrading of skills of individuals to perform better in a specific job situation. Therefore, training programmes are designed to help an individual to learn and develop skills. These programmes are designed keeping in view the target audiences. According to the Institute of Training and Occupational Learning (ITOL), “training is a planned activity designed and performed to help an individual or a group to learn to perform a job or task effectively. This activity can be pre-service or in-service on the job training course or a workshop, and an open learning package or computer based training (CBT)”.

According to Expert Group of Commonwealth Secretariat (EGCC) report, much of the training in the techniques of distance education has been done on the job, although short courses have been offered at various institutions in Australia, Britain and Canada. As distance education has grown, so has the demand for professional training. This comes both from educators working full time in distance education and from regular teachers who need to learn the particular skills of writing for distance students and tutoring them.

There are a number of ways to organize training programmes in distance teaching institutions. One of the ways is in-house training/workshop organized in face-to-face mode. You also know that distance learning can be

an effective way to provide training to staff without moving them away from their job. However, at times, staff may be taken out of their work environment to provide necessary training in the form of some apprenticeship training or participation in a seminar/conference. You may be aware that training activities can be organized for individuals (on one-to-one basis) and for groups in an institution.

To make any training programme relevant for the target group and ultimately effective, it is necessary that a systematic approach be adopted for the whole process. This implies that training follows a series of events in a cyclical manner. These are: preparing a training plan, training design, implementation and evaluation. Following the training cycle would help you not only to design a good training programme but also to achieve the desired results. The systematic approach is also a guide for you to perform the activities systematically.

As you may be aware, a training design of a training programme is based on the actual needs and training objectives. The training design should also specify methods and materials, evaluation including items to measure trainees learning outcomes. The ADDIE approach is one of the commonly used approaches in training programmes. It has five phases for designing which are analysis, design, development, implementation, and evaluation. Let us now examine these approaches in the following sessions.

17.4 ANALYSIS PHASE

In the ADDIE approach, analysis is the first phase that has to be done in a systematic way. As you know, analysis is the process of breaking a complex task into small and simple components. Hence, there is analysis and specification of what the trainees need to know, to perform better. This phase has six aspects. Let us discuss each aspect in detail.

17.4.1 Context Analysis

As an instructional designer, you should be aware of the environment/context, where training is being planned. It is important to understand the customers or the client (learners) for whom you are planning a training programme. Therefore, it is necessary that the instructional designer has deep understanding of the actual working context and should understand the scope and boundaries of operations within which the training problem exist. During context analysis, we are actually interested in three aspects: the task, the trainee/employee and the support system for training. We will discuss the first two in details in the subsequent sub-section. The support system for training includes the management's commitment to training, organizational policy to train people, and resources to conduct training. Resources include financial commitment, trainers, training facilities and equipment. If we have an understanding of our role as an instructional designer and if our relationship with the client (learner) is good, we will be in a better position to design relevant training solutions.

17.4.2 Job Analysis

An organization normally has many functionaries. For example, a distance education institute has a Head, teachers, administrative staff, and so on. Each of these functionaries has certain activities/tasks to perform. In most

organization 'job descriptions' are already available. which are an outcome of job analysis. However, if you have to prepare a 'job analysis' then the following tasks or activities need to be done:

- Ask experts/master trainers/instructors to list the critical tasks;
- Ask employees/workers to list what they do;
- Observe people doing their work; and
- Talk to supervisors of an organization and prepare a list.

Using a mix of all the above approaches, we can list the following steps in job analysis. These are:

1. Identify precisely the job to be analysed. Sometimes a job may include many tasks, and thus we need to make an inventory of all jobs, and undertake analysis of each one of them.
2. List all tasks required to perform the job.
3. Verify the list by discussing with 8-10 employees.
4. Determine how frequently each task is performed by asking 8-10 workers/supervisors to rate the task using a scale such as:
(a) Seldom (b) Occasionally (c) Monthly (d) Weekly (e) Daily.
5. Determine the relative importance of each task by asking people to rate in the following scale:
(a) Marginally important, (b) Moderately important, (c) Important, (d) Extremely important.
6. Assess the difficulty level of learning the task by asking the workers/supervisors to rate them according to the following scale:
(a) Easy, (b) Moderately difficult, (c) Difficult, (d) Very difficult.
7. Prepare the total score for each of the tasks listed. The higher the score of a task, the more important the task is for training.
8. Discuss the results of the analysis with key people in the training system.

17.4.3 Task Analysis

As mentioned in the above sub-section 17.4.2, a task is a function that a job holder performs. Tasks have a definite beginning and end; they are observable and are usually written in a way that shows highly specific actions. Thus, a task always has an action verb attached to it. The process of breaking down a task into consecutive steps or components is called task analysis. Task analysis helps in formulating training objectives and identifying elements and/or procedures involved in training programmes.

17.4.4 Gap Analysis

During the gap analysis stage, the performance problems are ascertained. The gap between desired performance and actual performance is the performance problem as shown below:

$$\text{Desired performance} - \text{Actual performance} = \text{Performance problem}$$

Undertaking context analysis, job analysis and task analysis is only half the information. Not all trainers/instructional designers carry out job and task analysis, as they receive the list of jobs and tasks required for performing efficiently. But, it is essential to undertake gap analysis before designing training, and thus it is a mandatory step in the analysis phase. The task analysis report becomes the beginning of the gap analysis. In gap analysis, we are concerned with the actual performance of the employees and hence gathering accurate data becomes very important. We can rate individual employees if we directly know their work and/or observe their performance. Otherwise, we can interview their supervisors and can also ask the trainees to rate themselves. We can also develop tests or performance measures to assess how the trainee performs in each of the tasks. Steps involved in gap analysis are as follows:

1. List the steps involved in a task in order to priority scores (highest to lowest).
2. Rate each step of the component by a mixed group of workers and supervisors to determine proficiency level using the following scale:
(a) Poor (b) Average (c) Good (d) Very good (e) Excellent
3. Summarize the individual responses to express an aggregate average.
4. Review proficiency ratings and identify low scores as performance gaps.
5. Determine the cause of the gap and whether it can be addressed through training.
6. Discuss the results of the gap analysis with key people in the training activity.

From this discussion, we can infer that gap analysis involves benchmarking the current performance against the desired performance. We may be assessing skills, knowledge, and attitude of the target group vis-a-vis the organizational goal and opinion of trainees regarding the current performance. The gap between the 'current state' and the 'desired state' gives us the 'needs' for the training curriculum.

17.4.5 Cost Analysis

This is one of the most important steps in the analysis phase. Often cost analysis is not considered but it should be considered at the beginning itself. Once we identify the problem for which training is required, we should estimate the cost involved in conducting the training. This should be as accurately analysed as possible. It is a kind of budget preparation for the training programme. Once the cost of the training is estimated, we should compare it with the cost involved in not solving the performance problem. Also at this stage, we should consider different options available for training such as on the job training, off the job training (in-house training/outside organization training), online training, distance learning, etc., to ascertain cost effectiveness. Some of the major heads involved in cost analysis of a training programme are: participant's salary, loss due to their non-participation in work place due to participation in training, classroom overheads, administrative support, instructor cost, cost of materials and supplies, cost of equipment, transportation, etc.

17.4.6 Trainee Analysis

Some training specialists consider this as ‘audience analysis’. For instructional designers, it is important to know the anticipated number of trainees, where they are located, their educational and experiential background, their career level, age, etc. As discussed in the previous unit, Heinich, *et al* (1999) emphasized the ASSURE model, which indicates the need for the understanding of the general characteristics of the learners, their specific entry behaviour and learning styles. Information about the age, educational level and experience of the learners can help in designing training programmes.

Understanding the entry level behaviour of the trainee in terms of their knowledge, skills and attitudes is important for pitching the training programme at an appropriate level. In fact, the gap analysis gives an idea about the entry level behaviour of the trainee. Training programmes conducted at the level of entry behaviour have to be designed in such a way that there is a gain for the learners. Also, if the training programme is at the level of post-training behaviour of those who have already undergone the programme, it will result in a learning gap.

Check Your Progress 1

Note: a) Write your answer in the space given below.

b) Check your answer with the answers given at the end of this Unit.

Discuss the analysis phase in instructional design for training.

.....

.....

.....

.....

.....

17.5 DESIGN PHASE

The design phase follows the outcomes of the analysis phase. The outcomes of the design phase are ‘training plan’ and ‘lesson plan’. The design phase consists of the following activities:

- 1) Prepare training objectives
- 2) Organize training content
- 3) Design instructional strategies
- 4) Select training methods and media
- 5) Design assessment strategies

We will discuss these activities in detail.

17.5.1 Preparing Training Objectives

What is the basis of objectives? For a training programme, the objectives emerge from the gap analysis carried out at the analysis phase. The results of gap analysis tell us about the areas in which training is required. However, it is important that these tasks and gaps are stated in such a way that they are

able to be reflected in the objectives of the training. These stated objectives are statements that a trainee will be able to do at the end of a training session or training programme. According to Tim Wentling (1993), training objectives are:

- Help the trainer develop and conduct training that provides the trainee with the knowledge and skills they need;
- Provide the trainees with a clear understanding of what they will be expected to do as a result of the training; and
- Help both the trainer and the trainee evaluate the learning that has taken place through instruction.

According to Mager (1990), objectives have three components. These are:

- *Performance*: What the learners will do to indicate that they have learnt? It is usually written using action verbs.
- *Conditions*: The circumstances under which the learners are expected to perform; and
- *Criteria*: The standard that defines acceptable performance.

Let us discuss these above components with the help of an example.

After the training, the trainees should be able to copy a table from a spreadsheet and paste it onto a word processor in 2 minutes without consulting the manual.

Performance (action verb): Copy, paste

Condition: Without consulting the manual

Criteria: To be completed in 2 minutes

17.5.2 Organize Training Content

The process of organizing training content actually starts at the time of job and task analyses. The priority of the content sequence is drawn from the training need analysis. However, it is possible that the training may follow a different pattern due to the demand of the subject and/or the profile of the target group. The sequence of the topics in a training programme is very important because of its impact on the learning process.

According to Tim Wentling (1993), the guiding principles for organising the content in a training programme are:

- Use job performance order.
- Move from simple to complex.
- Move from known to unknown.
- Move from general to specifics.

17.5.3 Designing Instructional Strategies

This stage requires us to specify (i) the appropriate method to help trainees achieve the objectives; and (ii) the media and technology that can be utilized

in the training to facilitate the achievement of the objectives by the trainees. Traditionally, we have used the following methods in training situations.

- *Lecture/presentations*: Usually an oral presentation by the trainer that gives all the trainee equal opportunity to see and hear information. It can accommodate large group size, but the learners are only passive recipient of information. Some lectures also involve questions-answers at the end, making it little more interactive.
- *Discussion*: The trainer leads a small group of learners and facilitates their involvement in critical thinking, reflection and discussion.
- *Demonstration*: The trainer shows a correct process of doing a task.
- *Tutorials*: These are used to provide maximum individualised instructions and involve a high degree of learner participation. It is mostly remedial in nature.
- *Problem solving*: It is a scientific method of enquiry where learners use previously mastered content to sharpen their skill of decision-making, analysis and evaluation.
- *Games*: These are highly interactive process of learning that appeals to both young and old alike. They provide opportunities for skill practice and improve communication amongst the participants.
- *Role play*: In the instructional settings, trainees are given real life situation and asked to perform as they would do if it were in real life event. The performances by various players bring forth the issues for open discussion, where an audience can attempt to apply the implication of the performances.
- *Case study*: The case study is a problem solving exercise where detailed account of an event or a series of event is given. Based on the existing knowledge, the trainees read, analyse, interpret the case and provide solutions that can be discussed in group settings to arrive at the best possible solution to a problem.

In training situations, we use a variety of media such as video, audio, slides or power point presentations, and models. Apart from these, printed text in the form of handouts, readings and self-learning lessons are also commonly used.

17.5.4 Selecting Training Methods and Media

For each of the content areas identified and the objectives listed, we need to identify the most appropriate methods and media to be used. The nature of the objective (knowledge/skill/attitude); and the complexity of the content determine the trainer, ability to use a method and medium; the group size of the trainees; and availability of training equipment and facilities are also be important. Tables 17.1, 17.2 and 17.3 give some examples of matching methods and media to objectives, group size, and content respectively.

Table 17.1: Types of Objectives *Versus* Methods and Media

Objectives	Methods and Media
Knowledge based	Printed handouts/lessons, lecture, audio programmes, video programmes, case studies, tutorials.
Skill-based	Demonstration, video programmes, problem solving exercises, instructional games.
Attitude-based	Field visits, role playing, case studies, videos, games, discussion.

Table 17.2: Group Size *Versus* Methods and Media

Group Size	Methods and Media
3-15 people	Demonstration, discussion groups, role plays, study visits, case studies, games, tutorials
More than 15 people	Lecture, video, audio

Table 17.3: Nature of Content *Versus* Methods and Media

Nature of content*	Methods and Media
<i>Conceptual</i> A group of objects, symbols, ideas or events that are defined by a single word or term, share common features, and vary only in irrelevant features.	Printed text, lectures, problem solving, discussion tutorials
<i>Factual</i> Unique, specific information in the form of a statement or date or picture of specific objects.	Printed handout, lecture, audio programmes
<i>Process</i> A flow of events that describes how something works. It is not necessarily a task done by one person; many people or an organization may be involved.	Demonstration, video, audio programmes
<i>Procedure</i> A sequence of steps to be followed by one individual to accomplish a task or make a decision. A procedure contains directions or procedural tasks and contains actions that are done the same way each time.	Audio, video programmes, demonstration
<i>Principle</i> Directions for tasks that provide employees with guidelines for action. Employees must adopt the guidelines to various job situations. Principles require employees to use judgment and discretion when they apply them.	Games, printed text, lectures, tutorials, discussion

*(Source: Cisco Systems (2003) *Reusable Learning Object Authoring Guidelines: How to build modules, lesson and topics?* available: www.cisco.com.)

17.5.5 Design Assessment Strategies

You will recall that Assessment refers to the process of obtaining information about a learner's learning, programme and achievement, i.e., what and how well has the learner learnt by the end of a course and assigning a value to the performance.

In the design phase, we should plan for assessment of learner performance. To make the training successful, and facilitate the trainee to learn the content, we undertake different activities. But how can we know that the learners have achieved the objectives set in the beginning? You need to plan to measure achievement of objectives by the learners by designing an appropriate assessment strategy. Apart from helping the trainer to know whether learners have achieved the objectives, assessment strategies have the following purposes:

1. To emphasize important content;
2. To facilitate learning of training content;
3. To identify area of trainee's weakness at the end of the training;
4. To assist in the evaluation of training; and
5. To aid in curriculum revision.

At this stage, you need to develop a 'blueprint' (Ref. Unit 13, Block-3) on how the assessment will be conducted. We have discussed in detail about assessment and different types of assessment in Unit-15, Block-03.

Preparation of assessment blueprint

The blueprint is also called table of specification, where we include course content/objectives of the training plan and specify their relative weight, and list the type of tests, type of questions, and number of questions that can be asked to cover the entire curriculum. An example of a table of specification is given in Table 17.4.

Table 17.4: Table of Specification (for objective type test items)

	Relative weight	K/S/A	No. of questions	Total items
Session 1	35%			
Objective 1		K	5	14
Objective 2		A	3	
Objective 3		S	6	
Session 2	20%			
Objective 1		K	3	8
Objective 2		K	5	
Session 3	45%			
Objective 1		S	3	18
Objective 2		K	6	
Objective 3		K	6	
Objective 4		A	3	
Note: This is an example, for a training programme with 3 sessions.				

The assignment of relative weight is not an arbitrary task. Rather, it is based on the importance given at the task analysis level. Similarly, the Knowledge-Skill-Application (KSA) analysis is also taken from the specification of the objectives. But how many questions is to be asked is more or less decided by the trainer or instructional designer on the basis of the analysis.

17.5.6 Course Description: Training Plan, Lesson Plans

At the end of the design phase, you will have the ‘course description’ of the training programme, a ‘training plan’; along with ‘lesson plans’ for each of the sessions.

A typical course description or an overview of the training course will include the following:

- Course title
- Purpose of the course
- Objectives of the course
- Training methods
- Target group/audience
- Venue of training
- Duration and schedule
- Trainer/Resource Person
- Logistical arrangements including accommodation, travel, fees, cost analysis etc.

The above information is usually covered in the *marketing brochure* of the training programme.

A ‘training plan’ is a schedule of activity of the training described session-wise with the following information for all sessions.

- Session number
- Session title/topic
- Session objectives
- Methods suggested for the session
- Assessment strategy
- Duration, timing and date
- Name of the trainer (s)/Resource Persons

Lesson plans are prepared for each of the training sessions. Normally, lesson plans are prepared by respective trainers. A typical lesson plan contains all the information relevant to a particular session. However, it goes beyond this information and outlines the step-by-step strategies to be adopted by the instructor. Thus, in the lesson plan the topics to be covered is broken down into small chunks and how the specific chunk will be presented is described with time estimates and resources needed to perform the instruction.

Thus, at the end of the design phase, the deliverables will include the objective, content, instructional and assessment strategies.

Check Your Progress 2

Note: a) Write your answer in the space given below.

b) Check your answer with the answers given at the end of this Unit.

1. Discuss different methods/instructional strategies used in training situations.

.....

.....

.....

2. What is a training plan? Develop a training plan for a session of a training programme.

.....

.....

.....

.....

.....

17.6 DEVELOPMENT PHASE

Many instructional designers and training specialists consider the 'development' phase as part of the 'design' phase and therefore, it is also called 'design and development' phase. We have separated development from design, as we believe, development tasks are taken care of only when there is a design specification. Based on the organization or carrying out 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.

17.6.1 Preparation of Presentations

This task is usually carried out by individual trainers. However, often the presentations prepared by different trainers are formatted uniformly by the training organizers to give a uniform look. We will discuss how you should prepare your presentation assuming that you have access to a computer and can use MS-PowerPoint. The use of PowerPoint presentations has become very common in training programmes. We can also take contents of PowerPoint presentations in pen drives for presentations using a laptop or a computer and overhead projectors (OHP). Using PowerPoint also helps us to prepare handouts in different formats easily. Presentations are also instructional aids that use graphics/pictorial information to facilitate learning. Visual illustrations provide concrete reference to ideas and concepts explained in words. They can motivate learners by attracting their attention.

17.6.2 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. Role plays, case studies, and tests are all activities that the trainees perform in the course of a training programme. As instructional designers, it is our role to design the activities listed in the training plan/lesson plan, and state clearly what is expected of the participants.

17.6.3 Preparation of Other Instructional Materials

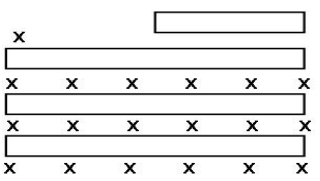
Apart from your presentation for which you may have to do a little research, the training plan might also have indications of the use of a variety of learning materials such as a case study, an audio programme, a video programme, some extra reading, etc. Thus, in the development phase, we are concerned 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. The primary focus here is 'not to reinvent the wheel'. So, if a video programme that suits your need, there is no need to spend time and money to re-create another one? It is always prudent to get the copyright permission and use it in your own programme. While selecting the training materials, we should ask the following questions:

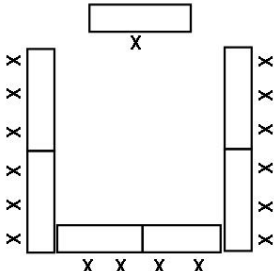
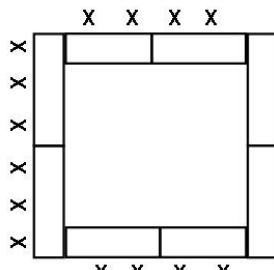
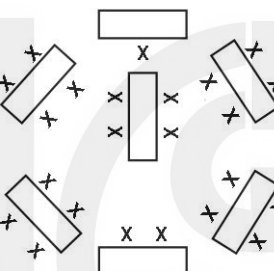
- Does it match participants' requirements?
- Is it good in terms of technical quality?
- How current it is?
- Is it clear and to the point?
- Is it free from objectionable bias and advertising?
- Is there any evidence of prior effectiveness?

17.6.4 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. Table 17.5 shows some of the commonly used sitting plans with their functional properties. You should also check the power connection in the room and check whether all the necessary equipments are in working condition.

Table 17.5: Sitting Plan in a Training Room

 Conference Session	• Large number of people can be accommodated depending on the size of the hall • High trainer control • Reduces interaction
--	---

 U-shape	• Allows discussion and interaction • Small group work relatively easy to conduct with movement of chairs • Trainer can move around easily
 Square shape	• Useful for small group work • Trainer can take any position • Sometimes, this also becomes a round shape/table arrangement
 Banquet style	• Emphasize more group work and less by trainer presentation • Highly informal atmosphere, mostly used in lunch/dinner presentations • Trainer is essentially a facilitator who moves from table to table

(Source: STRIDE Handbook-15, Staff Training and Development in Open and Distance Education, pp. 90)

Check Your Progress 3

Note: a) Write your answer in the space given below.

b) Check your answer with the answers given at the end of this Unit.

What are the different seating plans that can be used in a training room?
Describe with the help of illustrators.

.....

.....

.....

.....

.....

17.7 IMPLEMENTATION PHASE

Any amount of planning in terms of analysis, design and development will go in vain 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.

17.7.1 Administrative Coordination

This is primarily the responsibility of the training department and covers all necessary activities necessary for running the training programme. Well organised training programmes have few 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; and
- Socialization of the participants.

17.7.2 Conduct of the Training: Some Guidelines

The actual conduct of the training depends on the quality of the trainers engaged in the activity. There are a large number of guidelines available for conducting training sessions. But we would like to list a few *guidelines* for conducting a training session.

1. Introduce the topic in the best possible way so as to grab the attention of all the participants.
2. Use pauses effectively
3. Describe the framework of the session, its objectives, etc.
4. Ask questions to facilitate and involve participants and so on the learning process.
5. Use effective non-verbal communication (e.g., facial expression, body language and eye contact).
6. Give appropriate feedback to the participants.
7. Try to take along all the participants together.
8. Use training aids appropriately.
9. Help trainee to relate their new learning to work place.
10. Motivate the participants by relating to real-life examples.
11. Ensure that the participants learn, during the sessions and sessions are not loaded with information.
12. Manage time effectively so as to finish the session on time; and change in the presentation styles 12-15 minutes.
13. Summarize frequently the main points. Also recapitulate at the end to help participants internalize the content; and
14. Be creative.

17.8 EVALUATION PHASE

“Evaluation is the process for gathering information about the worth or quality of something as a way of making decisions designed to increase its worth or quality” (Newby *et al.*, 2000, p. 220). It is the last stage of the ADDIE approach of instructional design for training. Though it is carried out at the end, in practice, evaluation is a continuous process that is carried out 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 for the organization. There are two types of evaluations that can be used for evaluating training programmes. These are as follows:

Formative evaluation: This is concerned with identifying the weaknesses of the process of the training. That allows 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, though it can also indicate how we can improve the quality of the training programme and what areas can be improved upon.

Check Your Progress 4

Note: a) Write your answer in the space given below.

b) Check your answer with the answers given at the end of this Unit.

1. List five guidelines for conducting a training session.

.....

.....

.....

.....

.....

2. What are the two types of evaluation that can be used for evaluating training programmes?

.....

.....

.....

.....

.....

17.9 LET US SUM UP

In this unit, we have discussed the ADDIE approach for instructional design for training. This approach has five phases which include analysis, design, development, implementation, and evaluation. In the design phase the trainer is required to develop a training plan which outlines the training objectives, content, instructional strategies as well as selection of training methods and

media and assessment strategies. The development phase is one in which the presentations, activities, other instructional material is prepared along with the designing of the training sight. In the implementation phase the effort is made to ensure that all administrative coordination as well as conduct of the actual training is done smoothly. The last phase is of evaluation where the objective is to obtain feedback so as to improve the training programme and measure how valuable it has been to the participants. This involve both formative and summative evaluation.

17.10 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress 1

The analysis phase of training consists of context analysis, job analysis, task analysis, gap analysis, cost analysis, learner analysis. Please refer to section 17.5 for description of all these phases of analysis.

Check Your Progress 2

1. The methods or instructional strategies used in training situation are: lecture/presentation, discussion, demonstration, problem solving, role play and case study. (Please refer to sub-section 17.5.3)
2. Please refer to sub-section 17.5.5

Check Your Progress 3

Please refer to 17.6.4 for the different seating plans. Remember to ensure that they match the needs of the programme and the trainees.

Check Your Progress 4

1. Please refer to sub-section 17.7.2 and write the guidelines for conducting training programmes.
2. Please refer to section 17.8 and discuss the formative and summative evaluation.

UNIT 18 INSTRUCTIONAL DESIGN IN DISTANCE EDUCATION

Structure

- 18.1 Introduction
- 18.2 Learning Outcomes
- 18.3 Need for Designing Instructions in Open and Distance Education
- 18.4 Instructional Design for Curriculum Planning
- 18.5 Instructional Design for Self-Learning (Print) Materials
- 18.6 Formats of SLMs
- 18.7 Writing a Self-Learning Unit: Format of a Unit
- 18.8 Unit Layout and Design: Instructional Devices
- 18.9 Instructional Design for Non Print (Audio Visual) Materials
- 18.10 Models of Communication
- 18.11 Let Us Sum Up
- 18.12 Check Your Progress: Possible Answers

18.1 INTRODUCTION

In the previous Unit-16 of this Block, you have read about instructional design for the classroom and about formulation of lesson plans. You have also read about the different phases of designing training programmes through the ADDIE approach (Unit 17). These units have given you a background for instructional design in different situations and environments. You have learnt from the previous units that instructional design covers curriculum design, planning of syllabus, lesson plans, Units/Blocks, courses/programmes, selection of content in courses or units, integration of methods, and media, and assessment strategies. Now in this unit, we will focus on the specific components involved in instructional design for open and distance education (ODE) i.e. the relevance and significance of designing materials in open and distance education (ODE). We will take up both self-learning materials that are print based as well as instructional design for audio and video programmes. You will read in detail about designing interactive multimedia (IMM) and designing e-learning in Units 19 and 20 of this Block. This unit will help you to also connect the previous knowledge related to theories of learning and different instructional design models and will thus help you to apply theoretical knowledge and understanding to design print, audio and video components of ODL.

18.2 LEARNING OUTCOMES

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

- explain the need for designing instructional materials in distance education;
- discuss the concept of curriculum planning;
- explain the process of designing instruction for self-learning printed materials; and
- explain the theories and models of communication process for designing audio and video programmes in ODL.

18.3 NEED FOR DESIGNING INSTRUCTIONS IN OPEN AND DISTANCE EDUCATION (ODE)

Heterogeneity in student population, demands careful and systematic designing of units/courses to cater to individual needs. The open and distance education learners have different socio-educational backgrounds, experience and aspirations. So, there is a need for designing instructions in ODE. (Refer Unit 12, Section 12.3 and Table 12.1)

18.3.1 Characteristics of Open and Distance Education Learners

Let us now try to understand why there is a need for designing instructional materials in open distance learning. As you will recall distance education is different from classroom education. It is a mode of education in which the teacher and students are placed at a distance from each other. The teaching process involves self-learning printed material as well as different forms of technology. These could be audio and video programmes, online programmes, and web based portals. Learning could be synchronous as well as asynchronous. The learners who study through distance education demonstrate their own unique characteristics. This includes diverse educational backgrounds, different age groups, socio economic backgrounds as well as geographical dispersion. This heterogeneity amongst learners places them at different points in the learning cycle. Therefore, the open and distance learning system provides for flexibilities which includes giving expanded registration periods of admission, credit accumulation of grades, examination system that are different so that each learner can attain 'mastery learning' at their own pace and place. This system also permits students to study according to their choice of subjects as well as place and time. The designing of distance learning materials is distinct because the learners are self-learners and therefore are autonomous learners. They are self-directed and formulate their own learning goals. Most learners are mature and have their own life experiences. This makes distance learners and their learning habits different from learners of formal education. In other words, the characteristics of open and distance education learners are: demographic, diversity, self-motivation, learning factors, subject background, resource factors etc.

In view of the above, it is necessary that the instructional design in distance education should be based upon the above characteristic of the distance learners and the unique features of the open distance education system.

18.3.2 Goals, Aims and Objectives

Before designing any material, it is also necessary to reflect upon the goals and aims for which the course is being developed. Goals refer to the broad statements and general education goals that the concerned educational system follows. The vision and mission of every institution is derived from educational policy and is reflected in activities aimed to achieve these goals. The programmes of the institutions are also developed to achieve these goals. The goals are then reflected in the aims and objectives of the programme which in turn are reflected in the courses and its curriculum. There is a close relationship between overall goals and the curriculum of the courses.

18.4 INSTRUCTIONAL DESIGN FOR CURRICULUM PLANNING

Let us discuss the concept of curriculum planning before we go onto instructional design for self-learning print material. According to Jenkins and Shipman, (1975), “a curriculum is a formulation and implementation of an educational proposal, to be taught and learned within schools and other institutions and for which that institution accept responsibility at three levels: its rationale, its actual implementation and its effects.”

According to Rowntree (1992), curriculum refers to “the total structure of ideas and activities, developed by an educational institution to meet the needs for students and to achieve desired educational aims.”

According to Hass (1987) “a curriculum is all the experiences that an individual learner has in a programme of education whose purpose is to achieve broad goals and related specific objectives which is planned in terms of framework of theory and research or past and present professional practice.”

A curriculum is an inventory of items of information, skills etc., which have to be taught to the students. A curriculum is a charter or a plan or a framework which prescribes the educational activities of an institution. Thus we see that a curriculum is a plan or a framework which contains goals which are reflected in the set of educational objectives. Based upon the goals and objectives, the curriculum contains relevant course content, which includes activities that forms a part from the planned learning experiences. The teacher creates a teaching learning environment through an appropriate transactional strategy for attaining the goals and outcomes. The curriculum also contains the evaluation strategy to access whether learning has been actually achieved by the learner.

A curriculum in open and distance education may be based upon its philosophy and use of technology. For instance, the curriculum could be subject centred or learner centred. The approach could be the subject area approach i.e. the curriculum is organized around the different areas of particular discipline. It could also be a broad field's approach, wherein the curriculum combines a few areas and is built around these areas. The third approach could be that of a social problem approach wherein the curriculum deals with major problems of social importance. The fourth approach could be the emerging needs approach in which the learner needs are placed at the centre and therefore learner development is considered most important. In distance education, different approaches are used while developing the curriculum. The curriculum planning is usually done keeping the learner at the centre. At this stage, you may like to understand the difference between curriculum and instruction. Curriculum refers to ‘what’ aspect of student experiences, while instruction deals with delivery or execution of these student experiences. Curriculum includes instruction. The systems approach to *course planning* is often followed in distance education. In this method, the first step is that of identifying learner needs which is followed by stating the objectives with relevant resources as well as deciding on the choice of methods to be adopted and the development for course materials. This is followed by the feedback and subsequently an evaluation to see how the course planning is taking place and what changes need to be made in it.

Check Your Progress 1

Note: a) Write your answers in the space given below
b) Compare your answers with those given at the end of the unit.

1. Describe the concept 'curriculum' in your own words.

.....

.....

.....

.....

2. Differentiate between curriculum and instruction.

.....

.....

.....

18.4.1 Course Planning and Sequencing the Curriculum

The next most important aspect is of transforming the curriculum into a programme/course. There are different models that have been adopted by ODL institutions. But these follow a basic common philosophy i.e. the philosophy of breaking down the curriculum into small chunks of learning so that it can be easily handled by the self-learner. Let us now look at the model followed by IGNOU for course planning. The IGNOU model has the following components.

- **Programme**

A programme designates the area of study of a discipline, the study of which would lead to a qualification. This programme could be a certificate, diploma or undergraduate or post graduate programme. It could also be an awareness generation or life enrichment programme.

- **Courses**

Each programme comprises the sub areas of the overarching programme and each course takes up a particular theme. Depending upon the level of a programme, the number of courses would vary. Therefore, a post graduate degree programme would have more courses as against the certificate programme. Similarly, the weightage of each course would also depend upon the number of credits that have been assigned to that particular course.

- **Block**

The block is the next component of the course and comprises yet another dimension of the course. Each block may contain 4 to 5 units.

- **Units**

A unit is a self-contained component of the block that takes up different learning concepts as identified in the curriculum. A unit in turn is structured and consists of sections sub-sections which are systematically numbered and have scope for self-check formative assessment as well as activities to create interactivity for the self-learners.

Thus ODL institutions can structure the curriculum into modules, lessons, units based upon the basic philosophy of having small self-contained units for easy comprehension by the self-learner.

18.4.2 Sequencing the curriculum to develop a course

Another aspect of course planning relates to the arrangement of topics of the curriculum. There are different ways to do this. According to Romiszowski (1986), Rowntree (1992), Freeman (2005), a curriculum can be sequenced using the following methods:

Table 18.1: Sequencing of curriculum

Method	Explanation
Topic wise	Identifying the topics and placing them in any order
Cause and effect	Identifying the phenomenon and the relationship between its cause and effect
Structural logic	Identifying a logical sequence of the topic
Problem centred	Identifying a problem and working out its solution (including using case studies)
Spiral	Using the inter connectivity between topics to build the concept
Chronological	Using a time based approach
Backward chaining	Using the solution to study the path taken to reach the outcome
Loose network	Studying the topic connecting them in a loose network

18.5 INSTRUCTIONAL DESIGN FOR SELF-LEARNING (PRINT) MATERIALS

As you may be now aware, the learner in an ODL system is an autonomous learner and is separated from the teacher by a physical distance. It is often said that Self-Learning Materials (SLM) performs the task of a 'teacher in print'. This is because the learner is at a distance, however all characteristics of the face to face teacher have to be transmitted through the materials. According to Holmberg (1983), the course material must be written in a conversational and personalized manner and the teaching learning process is a 'guided didactic conversation' that is taking place within the material. As you have read earlier, Michael Moore (2003) in his Theory of Transactional Distance stated that the greater the flexibility in the learning material, the lesser would be the distance between the teacher and learner. According to him, three variables, namely structure, autonomy and control, in the learning process were responsible for impacting the degree of distance between the teacher and learner. Effective self-learning materials can be developed based upon these theories.

According to Murthy (2005), the characteristics of effective learning materials are as below:

Self-explanatory: The content of the SLM has to be such that it provides clarity to the learner. It must be logically presented and move from simple to difficult. There must be consistency and continuity in the content.

Self-contained: The material must be self-sufficient and the learner should be able to obtain all relevant information within one cover. Therefore, it should be self-sufficient with content, evaluation, activities as well as

reference so that the learner is able to obtain a complete learning experience within the material itself.

Self-directed: Keeping in mind the fact that the teacher is at a distance, the material has to be written in such a manner that the learner is directed through the process of learning. The material should therefore be able to guide, instruct as well as have a scope for interaction and motivation.

Self-motivating: One of the major problems of self-learning is that learners may experience a lack of motivation. Therefore, the material must be able to stimulate learning and arouse curiosity within the learner and therefore drive the learner to achieve his/her learning goals.

Self-evaluating: The material must also be able to provide the learner with an opportunity to do a self-assessment periodically. Therefore, there must be scope within the design to incorporate formative assessment in the form of self-check exercises, areas for reflection, activities as well as points to ponder. This component would also help the learner to pace their learning and identify the areas which need reinforcement as well as more attention by the learner.

Self-learning: This is the most important aspect of ODL materials as the learner is a self-learner and therefore all materials have to have self-learning as the central theme.

Thus we see that the purpose of good SLM is to ensure that it creates interactivity and is able to motivate learners to study on their own. The personalized language as well as the format has to be designed to engage with learners and support their learning.

Check Your Progress 2

Note: a) Write your answers in the space given below

b) Compare your answers with those given at the end of the unit.

1. Describe the various characteristics of SLM.

.....

.....

.....

2. Give any two methods of sequencing the curriculum.

.....

.....

.....

18.6 FORMATS OF SLMS

Self-instructional units are a combination of interactive instructional steps and access devices, which helps a learner to easily access and assimilate the contents. A 'format' is the design of a unit adopted by an institution in respect of placement of various components of the unit, and it varies from institution to institution. Let us look at some instructional design formats used for developing ODL materials.

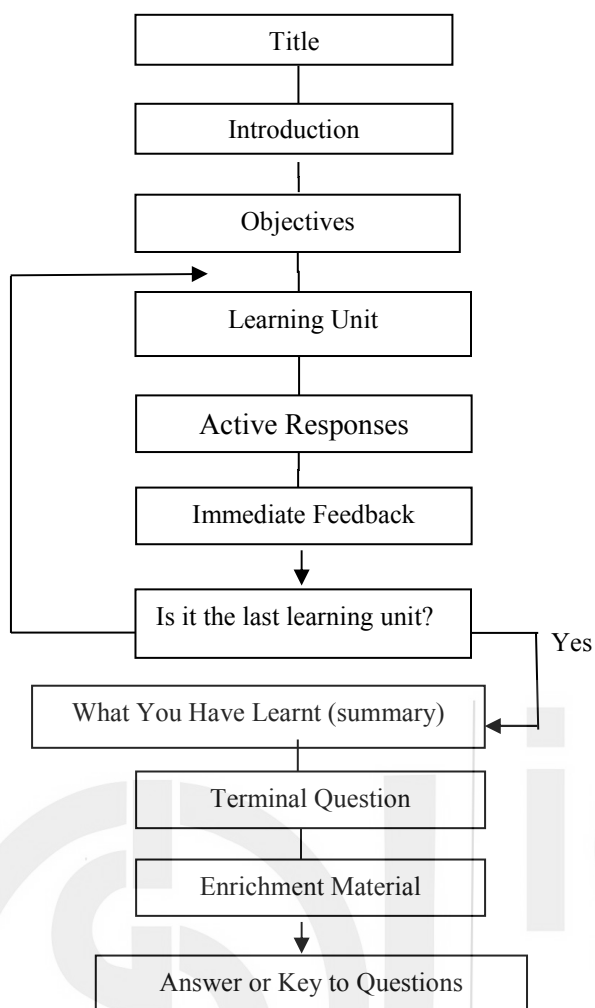


Fig. 18.1: Format 1, Instructional design for SLM
Source: Biswas, G. and Priyadarshini, A. (1999), pp. 197

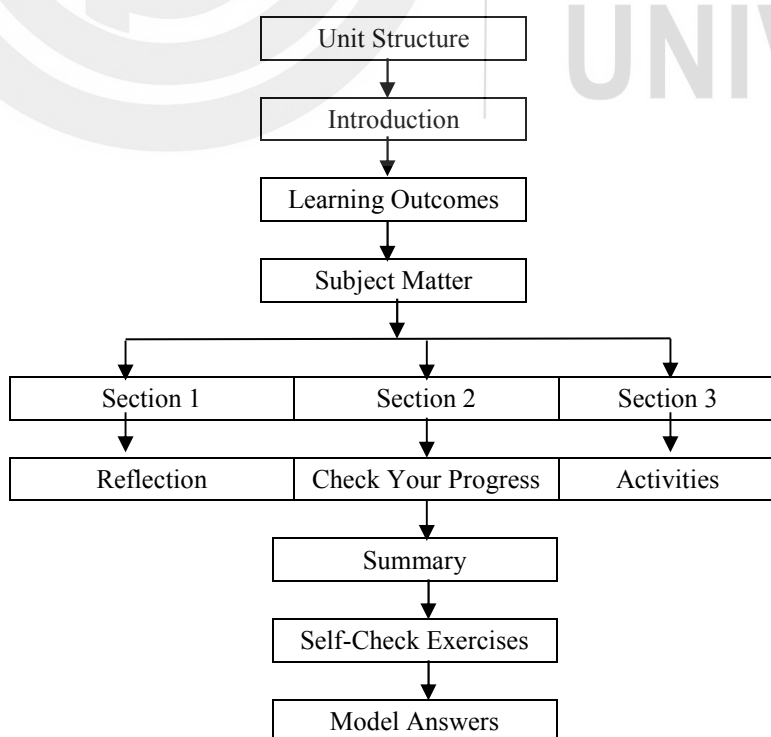


Fig. 18.2: Format of Instructional design for SLM: IGNOU Model

18.7 WRITING A SELF-LEARNING UNIT

Let us now discuss the methodology for writing a unit. This design may vary depending upon the level of the course as well as the discipline for which it is being written. For instance, the unit design for a Post Graduate degree course may be different from that of a course for young adolescents in a School level programme. However basic tenets remain the same i.e. to provide instruction to students who are self-learners. Let us look at the components of a unit as below:

A unit is divided into three parts. Look at Table 18.2.

Table 18.2: Components of a Unit

Part	Component	Purpose	Examples
I	Introductory part	Acts as an advanced organizer (Ausubel 1960). Introduces the unit and links to the previous and future units	Unit no., Unit title, Study hours, Unit structure, Learning Outcomes
II	Teaching learning part	Presenting the content of the unit in a self-learning format and content is presented in personalized manner	Sections, Subsections, Learning activities, Check your progress, Illustrations, Charts, Tables, Question for reflection boxes
III	Concluding part	Summarizes the unit and links to the next unit	Unit summary, Evaluation questions, Glossary, Answers to check your progress questions.

I. Introductory Part

The beginning of the unit acts as an introductory section. This part gives the learner an overview of the unit and therefore contains the unit number and unit title. In some cases, it may indicate the study hours also. Some other important components are:

i) Structure

This part of the unit lists out the different sections that are to be covered in the unit. It helps the learner to view at a glance the contents of the unit. It also mentally prepares the learner about the number of hours that would be needed to study the unit.

ii) Learning outcomes

The learning outcomes are to be based upon the curriculum and the identified competencies to be achieved. A unit begins with learning outcomes which are to be in behavioural terms and indicate the competency that the learner is expected to achieve upon completion of the unit. You have read about learning outcomes in Unit-13 of Block-3.

The unit writer needs to plan the textual materials in such a way that each section of the unit is based upon one learning outcomes of the curriculum, as given below:

Learning outcome 1	➡	Section 1	➡	Check Your Progress 1
Learning outcome 2	➡	Section 2	➡	Check Your Progress 2
Learning outcome 3	➡	Section 3	➡	Check Your Progress 3
Learning outcome n	➡	Section n	➡	Check Your Progress n

Fig 18.3: Relationship between Learning Outcomes sections and CYPs in the Unit

iii) Introduction or overview

The purpose of the introduction of the unit is to prepare the learner for studying the unit. It also prepares the learner to be mentally alert to begin the study and acts as a link between the previous unit of the course. Therefore, it presents a preview of what has been learnt so that the learner can connect to the forthcoming content of the unit. The introduction also creates a learning environment that motivates the learner to proceed ahead in the unit.

II. Teaching Learning Part

This part is the main body of the unit. A unit writer has to consider many aspects before starting to write this part i.e. the theoretical foundation, logical sequencing of the topic, ordering the content, self-assessment exercises as well as planning the reflection exercises within the unit. Let us read more about how to write the main body of the unit.

i) Sections and sub-sections – Theoretical Foundations and Models

The section and sub-sections constitute the main body of the unit. They contain the thematic area as well as the learning activities aimed at achieving the learning outcomes. Here the unit writer has to give sufficient thought to decide upon the presentation of the topic. There are different approaches and models that can be adopted. The unit writer may choose the Behaviouristic school of thought. (Unit 2, Block-1). The writer could also use the Cognitivist school of thought (Unit 3, Block-1). Another approach could be the Constructivist approach (Unit 4, Block 1) wherein the students create their own activities for learning. Here the unit writer could develop the content with the help of case studies and real world examples. For instance, the unit may begin with an activity in which the learner is required to discover, interact and draw a conclusion.

The unit writer may adopt the models such as those provided by Dick and Carey (Unit 5, Block 2). Another model is that of Component Display Theory (CDT). You have read about these models in Block-2, Unit-5.

The unit writer could also develop the main text based upon the nature of the discipline. For instance, a course may be designed using a chronological sequence where as another area may adopt a parallel theme approach where all the topics are presented as standalone areas and can be studied on their own. Another approach can be the concentric circle approach where one concept has a bearing on the other and flows from the previous idea. Yet another approach can be of cause-effect chain where the learner studies the causes that lead to a particular effect and therefore the learner is able to understand the relationship between two events. The unit writer may also take up a structural logic approach which is based upon the nature of the discipline and therefore one concept builds upon another concept and therefore the content has to be ordered in a logical manner. An approach that is often used by social scientist is that of a problem-problem centred approach. Here the learner is presented with issues and problems that need to be studied so that a solution can be identified. Yet another approach is that which is the spiral approach in which the content is developed from simple to difficult and each spiral is connected to the earlier one. In some cases, the unit writer may also adopt backward chaining approach where an event or

situation is presented first and then the learner is exposed to the events that were responsible for creating that situation. This implies that the learner would move backwards to understand the complete situation.

Activity 18.1

Given below are the Gagne's 9 events of instruction. Please try to plan the relevant instruction. One example is given for you.

Event No.	Gagne's 9 events of instruction	Plan of Instruction
1.	Gain attention of the learners	Share a related anecdote, cite the latest statistics related to the topic, show a cartoon
2.	Inform learners of the objectives	
3.	Stimulate recall of prior learning	
4.	Present the learning content	
5.	Provide guidance for learning	
6.	Elicit performance (allow time for practice)	
7.	Provide timely feedback	
8.	Assess Performance	
9.	Enhance retention and transfer	

ii) Principles of Ordering the Content

The sections and their development follows certain established learning principles. According to Romiszowski (1981), there are four principles of ordering content and these must be kept in mind when introducing a new topic. These are as follows:

Principle		
Simple	⇒	Complex
Known	⇒	Unknown
Particular	⇒	General
Concrete	⇒	Abstract

Fig 18.4: Principles of Ordering the Content

iii) Planning self-assessment

The self-assessment in the unit has to be within the text as well as in the concluding section. Here the writer has to design formative assessment so as to continuously monitor whether self-learning is taking place. This formative assessment could be in the form of self- assessment such as 'Check Your Progress' or In text Questions. It could also be Learning Activities that the learner has to undertake or in the form of Reflective Learning so that the learner learns from their own experiences. This formative assessment serves as a means for reinforcing learning, as well as motivating the learner to proceed ahead.

According to Freeman (2005), some of the points to be kept in mind while designing the self-assessment tests for the SLM are as follows:

According to Freeman (2005), some of the points to be kept in mind while designing the self-assessment tests for the SLM are as follows:

- The items cover the relevant content of the unit
- The items cover the learning outcomes
- The items are appropriate to the study hours allotted to the topic
- The items are appropriate to the learning environment of the learner and do not need any external resources
- The test items are appropriate to the domain which is being tested
- The items are diagnostic in nature
- The time taken for answering the items is appropriate
- The items allocate a word limit

The unit writer can design different types of self-assessment questions such as objective type, multiple choice, very short answer, fill in the blanks and others. Let us see some of the different item formats that can be selected by a unit writer for assessing the different levels of Bloom's taxonomy.

Table 18.3: Developing assessment based upon Bloom's Taxonomy

Level according to Bloom's Taxonomy	Some Action verbs (examples)	Type of question
Knowledge	List Define Recognize Label	Fill in the blanks True and false Match the following Very short answers Multiple choice questions
Comprehension	Describe Distinguish Explain Compare	True and false Match the following Short answers Multiple choice questions
Application	Locate Apply Appreciate	Short answer Application of a principle Demonstrate skills to create
Analysis	Analyze Discriminate Utilize	Short answer Essay Report Project
Synthesis	Generate Integrate Summarize	Short answer Essay Report Project
Evaluation	Justify Interpret Assess	Short answer Essay Report Project

III. Concluding Part

The end of the unit presents the concluding part and here the unit writer needs to summarize the unit by presenting the main points of the unit. In addition, this is also the section where the learning that has taken place may be evaluated. This could be in the form of terminal or global questions that form the part of the summative assessment. This assessment can be

be essay type questions that require analysis and inform the teacher about the depth of the knowledge and understanding acquired by the learner.

The last section of the unit also contains the answers to the self-assessment questions. This section helps the self-learner to assess themselves and rectify their mistakes if any. The closing section may also contain the glossary where definitions are given for relevant concepts. It could also contain abbreviations used in the unit as well as references that have featured in the unit.

Thus we see that the end of the unit is a closing section where the learners have an opportunity to assess themselves before moving on to the study of the next unit.

Quality of an SLM is defined in terms of:

- Validity i.e. purposeful and internally consistent
- Practicality i.e. users can and do use the materials as designed
- Effectiveness i.e. learners experience the materials as intended and achieve the intended objectives

Check Your Progress 3

Note: i) Write your answers in the space given below
ii) Compare your answers with those given at the end of the unit.

1. What are the three parts of a unit?

.....
.....

2. List the four principles of ordering of content.

.....
.....

18.8 UNIT LAYOUT AND DESIGN: INSTRUCTIONAL DEVICES

In distance learning, there are different means for delivering the course content. This may be in the form of printed self-learning materials or through online mode. Print remains by far the most widely used medium for open and distance education. Perhaps it is still the best medium for open and distance learning (Keegan, 1983).

Therefore, in addition to writing the unit, the unit writer also has to ensure that the text layout and design supports the self-learner. Most institutions develop their own 'house style' for the unit layout and design. The unit writer has to follow the standardized design. There are however some aspects to be kept in mind by the unit writer. Let us now learn about the different instructional devices that a unit writer may use to construct the unit (Fig 18.5).

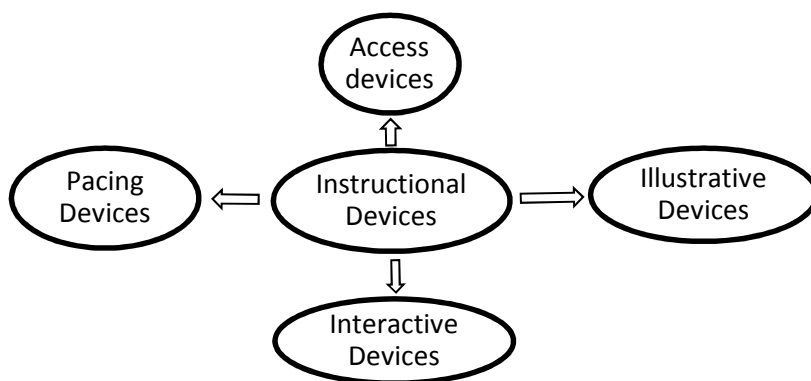


Fig 18.3: Instructional Devices

18.8.1 Access Devices and their Significance

According to Freeman (2005), access devices are the methods that are used ‘to help learners find their way around a piece of learning material’. Access devices help the learner to negotiate through the material as well as to help them make use of the materials. These devices are significant as they form guiding lights for the learner who are studying on their own i.e. they are self-learner and are studying at a distance. Access devices therefore help to make the material more learner friendly and personalized. Let us look at some of the access devices. A description of some access devices is as follows:

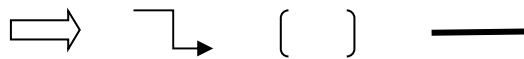
Table 18.4: Access Devices and their Significance

Component	Access devices	Significance
Introductory part	Title	To help the learner understand what is to be taught in the unit
	Structure of the unit	To give a bird's view of the contents of the entire unit, so that the learner is aware of sequential progression in the unit
	Introduction	To present the unit and link it to the previous unit
	Learning Outcomes	To identify competencies in terms of knowledge, skills, attitude that the learner is expected to achieve at the completion of studying the unit
Teaching learning part	Division of content	To indicate the sections sub-sections, headings into which the unit is divided
	Check Your Progress(CYP)	To help the learner to self-assess his/her learning and monitor self-progress
Concluding part	Summary	To study the main points of the unit
	Essay Type questions	To analyze the issues raised in the unit
	Glossaries	To provide an easy explanation/ definition of various terms used within the unit
	CYP: Possible Answers	To self-assess and take corrective measures to improve learning
	References	To identify the sources and read the original texts referred to in the unit
	Bibliography/ Suggested reading/Further reading	To read related books on the topic

Thus we see that the significance of access devices is to help the unit writer to bring the student as close to the content as possible. These devices help the learners find their way into the text. The Interactive Instructional Steps (IIS) perform the task of tutoring by providing subject matter in sections and sub-sections, followed by in-text questions, activities and so on.

18.8.2 Illustrative Devices

Illustrative devices are yet another important device to clarify concepts.



Illustrations help to provide guideline for effective use and also attract the attention of the learner.

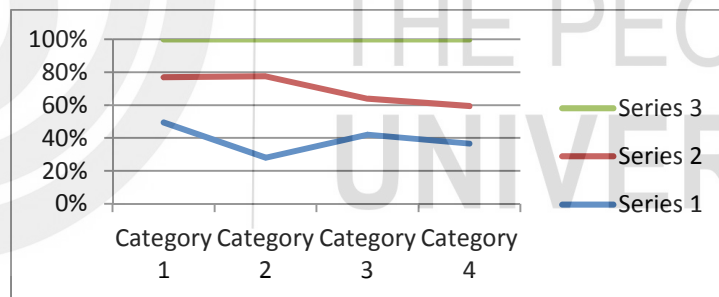
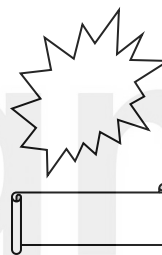
They can also be used as tools to recall the content and draw attention to a particular learning point. Illustrations also break the monotony of the content and act as motivational tools for the learner.

Some illustrations provide humour in the content.

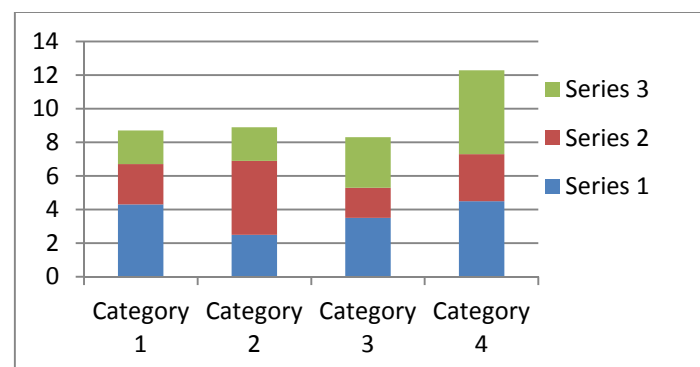


Illustrations are particularly useful for learners whose learning style is visually oriented. The unit writer makes use of any of the following:

- Drawings
- Cartoons
- Photographs
- Icons 
- Bullets
- Diagrams
- Tables
- Flow charts/Bar chart



- Figures
- Graphs



- Maps and Plans

18.8.3 Interactive Devices

Interactive devices are those that act as a tool for making the learning process more participatory. They encourage the learner to interact with the content for self-learning as well as for assessment. Some commonly used interactive devices include Learning Activities. In face-to-face classroom situations, a teacher may ask students to answer a question; take notes on his/her lecture, observe and record an experiment or demonstration, or do quick exercises. But in open and distance education, learning activities through printed SLMs aim at making learning effective and purposeful. A unit writer may develop learning activities that engage the learner in (a) Thinking (b) Writing (c) Doing.

Revisit Activity 18.1 – Does it make you think and write and do?

Some other learning activities are in the form of interactive questions. These could be Check Your Progress or Short Answer Questions with model answers or Exercise with possible hints at the end of the unit.

18.8.4 Pacing Devices

Pacing devices are devices that pace out the course i.e. they set a timetable for events to take place in the delivery of a course. According to Gibson and Graff (1992), pacing helps learner to complete the course and ensures that there is reduced dropout. Such pacing devices may be in the form of decisions taken as to when and how much of the course is to be given to the learners at a particular time, when the academic counseling is to be held, when the assignments are to be completed and when the examination is to be held. While pacing may be a policy decision of the ODL institutions, however it has an impact upon the way in which the materials is designed and delivered. Unit writers have to be aware of the institutional policies so that the units conform to the pacing format.

Check Your Progress 4

- Note:** i) Write your answers in the space given below
ii) Compare your answers with those given at the end of the unit.

Describe the access devices in a unit. What is the significance of access devices?

.....

.....

.....

.....

.....

.....

Activity 18.2

Develop a complete self-learning unit on a topic of your choice.

18.9 INSTRUCTIONAL DESIGN FOR NON-PRINT (AUDIO VISUAL) MATERIALS

Let us now move ahead to another aspect of instructional design i.e. how to design materials for non-print audio-visual materials.

In earlier units, you have read about the different learning styles of learners. Some learners learn by visual mode while others learn by hearing mode (audio). Some learners also learn better by reading and there are others who learn by audio and visual methods (visual, audio, reading, kinesthetic-VARK). The essential aspect for learning to take place is that of effective communication.

18.9.1 Theories of Communication and their Educational Implications for Designing Audio/Video Materials

“Communication is the art of successfully sharing meaningful information with people by means of an interchange of experience. The important word is ‘successfully’, which implied that a desired behaviour change results when the receiver takes the message” (Walklin 1993, p.164)

In distance learning, as you know the teacher and learner are placed at a distance and communication is taking place through print or non-print materials which leads to learning. There are different technologies by which communication takes place. The non-print learning materials include audio/video materials as well as e-resources. In this section let us learn more about non-print learning materials

As you will recall communication essentially means the exchange of ideas between the sender and the receiver. According to Shannon and Weaver (1949), the primary function of communication is to reproduce as faithfully as possible a message from one place to another place. According to Rodger, communication is a process by which people create and share information with one another in order to reach a common understanding. Communication has major education implications especially in distance education as it is the basis by which information knowledge skills are transferred through a medium from a teacher to the learner. In fact, different types of materials form the teacher in print or non-print.

Communication can take place in both verbal and non-verbal ways. While verbal communication includes the exchange of words, through which knowledge is transferred, it also forms a medium for motivating the learner, personalizing the teaching as well as receiving feedback from the learner. Non-verbal communication which takes place through non-print media is also an effective method of teaching. This involves the ways of communication other than using words. It also includes the use of body language in communicating experiences. The image of the teacher and the expression and emotions used during the communication have an effect upon the learning experience of the learner. Similarly, the gestures, and other mannerisms used during the communication have an impact on the learner. In addition to this the creation of presentations, handouts or use of sign language are also effective means of non-verbal communication.

In order to understand the development of material, it is important to also understand the different theories of communication. These theories have

educational implications for designing of Audio/Video materials. Let us also see their educational implications.

1. **Mathematical theory:** According to Shannon and Weaver (1949) the communication process is divided into different components that is the source, transmitter, signal and the receiver. The message is converted into a signal which is transmitted through a channel to the receiver. The channel forms the medium that connects the sender to the receiver. This theory was used in the field of engineering and mathematic but has substantial educational value, as during the teaching learning process the teacher forms the sender who has to transmit information/knowledge to the learner who is the receiver. A teacher may communicate with 25 or 50 or 100 learners. In the case of distance learning these number become larger. The use of technologies of mass media such as television, radio, other electronic media form the channel through which educational content is transmitted to large number in an effective manner.

The educational implications of this theory is that there is a great deal of information that is passed on by a variety of media and in the case of distance education where there is a diverse group of learners with different learning styles, there is high chance of a number of different media being used. Thus the availability of media helps the learner to choose what is best suited according to his/her learning style.

2. **Information theory:** This theory deals with the transfer of the messages and other information which may be verbal or non-verbal from one source to another. Here there is also scope for a two-way communication and therefore it is highly relevant for distance education. Large quantity of data can be transferred through different channels. There is ample scope for teaching along with feedback between the teacher and the learner. The provision for feedback helps in improving the quality of teaching. The implication of this theory are that due to the scope of feedback and two-way communication, which is possible through audio/video programmes, there is a scope for providing immediate feedback and increasing the level of interaction between the teacher and learner. This also serves as a stimulus for the learner to continue his/her learning and stay motivated.
3. **Free press theory:** According to this theory, a person should be free to express himself/herself and this freedom of expression is seen as a fundamental human right. While this theory was essentially aimed at the freedom of press, it has educational implications. Due to the vast growth of mass media technology and the freedom of publication through them, it is necessary to be responsible while communicating in the public domain. In the case of distance learning where the communication is to a mass audience, therefore due care must be exercised in the communication.
4. **Social responsibility theory:** According to this theory, the media has a social responsibility and must follow certain principles while printing or broadcasting. As technology becomes widely used by all sections of society and learners of all age groups, the need for maintaining self-regulation by all is important. It is also necessary that responsibility is demonstrated at all stages of operations, whether it is preparing the materials, identifying the objectives or interacting with the learner, such social responsibility has to be demonstrated.

18.10 MODELS OF COMMUNICATION

There are many models of communication. It is stated that as per Aristotle model, there are five factors of communication- speaker, speech/message, audience, effect and occasion. Shanon and Weavers model (1949) used the mathematical theory about which you have read in sub-section 18.6.2. Other models include Newcombs (1953) as well as Scramm's model (1954). In this section we will study two models which are closely related to open and distance learning.

18.10.1 The Bates Model

Bates (1995) had presented a model for developing open and distance learning courses. According to Bates (1995) while preparing courses, extensive pre-planning and design are necessary for distance learners, who often are working largely on their own schedules and perhaps independently. This model can be considered as a general road map to follow. Bates Model is known as front-end system design. It has four phases. These are:

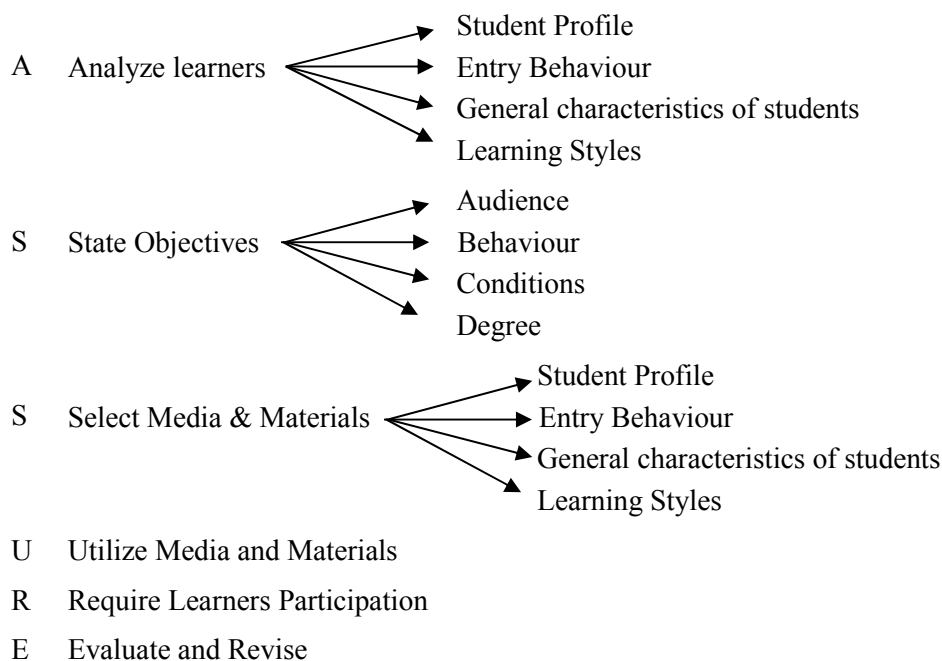
1. Course outline development,
2. Selection of media,
3. Development/production of materials and
4. Course delivery

This model also addresses ADDIE elements (Refer Unit 11, Block-03). This model focuses on building on components of a SLM. These are i) Structuring content ii) Student activities iii) Providing clear, necessary & timely feedback. This model focuses on integration of technology in the delivery of ODL courses.

The Bates model for selection of media is also known as the ACTIONS model wherein the instructional designer must take into account the Access of the selected media, as well as its Cost of development, the Teaching function in terms of its effectiveness, the Interactivity of the material, whether the material is able to be Organized within the existing facilities, the Novelty factor of the material in its ability to attract the attention of the learner, as well as the Speed with which the material can be developed and delivered.

18.10.2 Heinich, Molenda, Russel and Smaldino ASSURE Model (1999)

The next model that we will study uses the ASSURE model. You have already read about this model in Block-2 Unit-5. The ASSURE model can be used for learners with different characteristics and therefore is useful for distance learners. As you will recall in the ASSURE model A is for analyzing learners, S for stating the objective, S for selecting media and material, U for utilizing media and material, R for requiring learner participation and E for evaluating and revising. In this model, Heinich, Molenda, Russel and Smaldino have presented various means by which teachers can select media for improving their teaching learning. Similarly, they have also described how to use the media for effective teaching.



This model focuses on media and materials selection. The well written text and accompanying media components & websites are excellent resources for teaching at a distance.

Check Your Progress 5

Note: i) Write your answers in the space given below
ii) Compare your answers with those given at the end of the unit.

1. Explain the ACTIONS model for instructional design of non-print materials.

.....

.....

.....

2. Describe the main components of ASSURE model

.....

.....

.....

.....

18.11 LET US SUM UP

This unit deals with the design of self-learning print and non-print materials. There is a need for designing instructions in open and distance education as student- population is heterogeneous. The teacher and students are placed at a distance from each other, therefore the print or non-print materials form the tools for teaching-learning. ODL materials follow a systems approach for constructing the curriculum. There are different models for course planning and sequencing the Curriculum. In the model followed by IGNOU, the curriculum is broken down into smaller chunks that are demarcated as Programme – Course – Block – Unit. The arrangement of topics of the

curriculum can be through different methods such as topic wise, spiral, sequential, problem centered, cause and effect, structural logic. Effective learning materials have certain characteristics, which include that they are Self-explanatory, Self-contained, Self-directed, Self-motivating, Self-evaluating, Self-learning.

Self-learning materials follow a format based upon certain principles. ODL institutions decide on a standardized format for their programmes. This is called the 'house style'. A unit is divided into three parts: introductory, teaching learning and conclusion. Each part plays a role in the learning of the student. There are also certain established learning principles for ordering the content as well as designing the self-assessment exercises. The unit layout and design are instructional devices which also play an important part in helping the learner to negotiate through the materials. The instructional devices include access devices, illustrative devices, interactive devices and pacing devices. There are also different models for designing audio-video materials. These include the Bates model and the Heinich, Molenda, Russel and Smaldino ASSURE model. A unit writer has to keep in mind various theories and models to develop good quality print and non-print SLM.

18.12 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress 1

1. Curriculum is an inventory of items of information skills which a plan and forms the framework for obtaining the goals and objectives. It includes the relevant course content, planned learning experiences as well as the transactional and evaluation strategies. Please refer to section 18.1.
2. According to Rowntree (1991), curriculum refers to "the total structure of ideas and activities, developed by an educational institution to meet the needs for students and to achieve desired educational aims." Please refer to 18.4 and add other definitions.

Check Your Progress 2

1. Please refer to section 18.5
2. Please refer to section 18.4.2

Check Your Progress 3

1. The three parts of a unit are introductory, teaching learning and concluding part. Please refer to section 18.7
2. Four principles of ordering. are simple to complex, known to unknown, particular to general and concrete to obstruct. Please refer to 18.7

Check Your Progress 4

Access devices are those devices that help the learner to navigate through the material. The significance of the access devices is to that they help the material more learner friendly and personalized and bring the content closer to the learner. Please refer to section 18.8.1.

Check Your Progress 5

1. The Bates model is called the ACTIONS model where ACTIONS indicates access, costs, teaching function, interactivity, organizational function and novelty and speed of the media that is to be used in the material. Please refer to 18.10.
2. The ASSURE model can be used for learners with different characteristics. The steps of the ASSURE model are analyzing learner, stating objectives, selecting media and materials, utilizing media and material, requiring learners' participation and evaluating and revising. Please refer to 18.10.



UNIT 19 INSTRUCTIONAL DESIGN IN MULTIMEDIA *

Structure

- 19.1 Introduction
- 19.2 Learning Outcomes
- 19.3 What is Multimedia?
- 19.4 Interactivity and Interaction
- 19.5 Interactive Multimedia (IMM)
 - 19.5.1 IMM-Self-Learning Mode
 - 19.5.2 IMM-Electronic Mode
- 19.6 Designing IMM
 - 19.6.1 Analyze
 - 19.6.2 Design
 - 19.6.3 Develop
 - 19.6.4 Implement
 - 19.6.5 Evaluate
- 19.7 Let Us Sum Up
- 19.8 Check Your Progress: Possible Answers

19.1 INTRODUCTION

In unit 18 of this Block you have gone through the processes involved in designing print, audio, video, components of open and distance learning. You have studied different types of media used for transaction of content in Unit 16 of this Block. (See Table 16.5: Classification of Media). The selection of media for organizing content and integrating them for communicating content, ideas and information to support student learning in ODL is a challenging task.

The emergence of Information and Communication Technologies (ICTs) such as computers and multimedia, digital compression, satellites, fibre-optics, wireless networks, artificial intelligence, virtual reality, etc., have expanded our options for engaging in learning and teaching. Opportunities are also emerging for making effective use of ICTs that have been utilized in supporting the learning process both in campus-based education and open learning.

ICTs have the potential to deliver information to students in a variety of formats. These include the integration of text with audio, video and animation etc., to provide opportunities for diversified and heterogeneous students in ODL.

* Adapted with permission from Course: MES-056, Educational Technology, Block-4, Unit-3, Interactive Multimedia Materials and their Use, School of Education, IGNOU, New Delhi.

There is a shift from a text based learning to online learning due to increasing demands for education, training and skills upgrading in open and distance learning.

In the above paragraph, you have come across a few terminologies associated with ICTs. What is multimedia? It is the combination of media and use of different types or multiple media i.e., audio, video, graphics, animations and text in a computer programme.

This unit will help you to learn about interactive multimedia. This unit is planned to help you to describe the process of developing interactive multimedia and also to use them effectively in distance teaching-learning process.

In this unit, we will also focus on instructional design in multimedia, interaction and interactivity, and how to design an interactive multimedia (IMM) with the help of ADDIE approach (see Unit 11, of this course MDE-412, Block-03).

19.2 LEARNING OUTCOMES

After studying the unit, you should be able to:

- describe the concept and characteristics of multimedia (IMM);
- compare various modes of IMM in order to select the most appropriate mode(s) while developing IMM; and
- analyze the steps in the development of IMM with the help of ADDIE approach.

19.3 WHAT IS MULTIMEDIA?

Multimedia, as the term suggests, is a combination of various media. It is the use of more than one medium, i.e. audio, video, graphics, animations, and text in an integrated way. In other words, multimedia means the integrated use of two or more media.

The term ‘multimedia’ is used differently in different contexts. It can mean merely a textual document supported with audio/video. Multimedia can also be interactive. Though, multimedia is a combination of two or more media, it is not just mixing of these media. Vaughan (1996) uses the term ‘woven combination’ in the context of multimedia. According to Ravet and Layte (1997) the quality of a multimedia package depends on what is combined and how those are combined. The critical factor would be the way in which the media are made to work together to create an ‘elaborated whole.’ (see section 14.2, Unit 14, Block-03, Course MDE-418: Educational Communication Technologies). Let us now take a look about the two important terms associated with multimedia. They are: interactivity and interaction.

19.4 INTERACTIVITY AND INTERACTION

Interactivity is the extent to which one can interact with the context, a machine/technology, or a teacher/instructor. Interactivity involves active responding and explicit feedback. In the field of computer, the term ‘interactivity’ is being used across a range of applications. Many a times, it implies rapid random access, i.e. the facility to navigate the entire platform.

This is considered as the lowest level of interactivity. Interactive learning strategies may involve a range of activities to engage the learners. These include making choices and decisions, composing, taking notes, and making evaluations and judgments, constructing, drawing and controlling (Allessi & Trollip, 2001).

In other words, Interactivity is described as methods for exchange of ideas, views and opinions. It is specific to the content, technology or the electronic medium. For example, interactive use of a computer in which the student interact/communicate directly via a keyboard and a screen.

Interaction is described as an event on a method when people communicate with each other to exchange ideas or information. For example, exchange of idea in a discussion group, interaction between students, teachers and academic counsellors.

According to Sims (1997) eight levels of interactivity are:

- *Object interactivity* (i.e. proactive inquiry) refers to an IMM programme in which objects (e.g. buttons, people, things) are activated by using a mouse or other pointing devices. Clicking usually generates a form of audio-visual response. The functionality of such objects depends on previous objects encountered, previous encounters with the current object, or previous instructional performance.
- *Linear interactivity* (i.e. reactive pacing) refers to functionality which allows the user to move forwards or backwards through a predetermined linear sequence of the content. It is often called 'electronic page-turning'.
- *Hierarchical interactivity* (i.e. reactive navigation) provides the user with a predefined set of options from which the user can select a specific path or structure of accessing the content. The most common example of this interaction is the main menu where the user returns to select another option.
- *Support interactivity* (i.e. reactive inquiry) involves providing the user with a range of help options and messages, some of which can be very simple and others quite complex.
- *Update interactivity* relates to components of the programme that initiate a dialogue between the user and the computer-generated content. The programme generates questions or problems to which the user must respond to.
- *Construct interactivity* is an extension of update interactivity and requires the creation of an environment in which the user is required to manipulate component objects to achieve specific goals.
- *Reflective interactivity* (i.e. proactive elaboration) refers to text responses. If n text responses are available to the user there is always the possibility that the user will require the $n+1$ answer and the programme will judge the enquiry as "incorrect". Reflective interactivity responds by providing answers recorded by other users and allows the current user to compare and reflect on their response.
- *Hyperlinked interactivity* (i.e. proactive navigation) provides access to a wealth of information that the user is allowed to navigate at will. There are multiple paths creating a "maze" that the user needs to negotiate in order to resolve a problem.

- *Non-immersive contextual interactivity* (i.e. mutual elaboration) combines all previous levels of interactivity and extends them into a complete virtual training context. Users are transported into a micro world that reflects their existing working environment and the tasks they undertake mirror those of their working environment.
- *Immersive virtual interactivity* (i.e. mutual elaboration) projects the user into a complete computer-generated world which responds to individual movements and actions.

Multimedia is being used in many fields, e.g. business, industry, advertisement, entertainment, and education. Before discussing about IMM, let us discuss the role of a computer in the teaching-learning process and for designing multimedia.

Computer assisted instruction (CAI) is meant for self-learning mode. The learner interacts with the learning programme developed on a computer. Thus, CAI is an interactive learning technique whereby a computer is used to present the instructional material and monitor learning that takes place. CAI places the student in a conversational mode with a computer which has a programmed course, which selects the next topic or phase of study according to previous responses from the student, allowing him/her to progress at a pace directly related to his/her learning capability. A computer assisted instruction package can check the level of the entry behaviour of a student and advise the student accordingly to work in a course.

Check Your Progress 1

Notes: a) Write your answer in the space given below.

b) Compare your answer with the one given at the end of this unit.

Discuss any four levels of interactivity components stated by Sims (1997) while designing a multimedia for distance learners.

19.5 INTERACTIVE MULTIMEDIA (IMM)

In the previous section, you have studied eight levels of interactivity. Sims (1997) discussed interactivity with reference to an IMM programme. In this section we are presenting the characteristics of IMM. The characteristics of IMM are two types. They are:

1. IMM as a self-instructional mode
2. IMM as an electronic medium

Let us discuss these two characteristics in detail.

19.5.1 IMM as a self-instructional mode

The characteristics of IMM as a self-learning mode are the as follows:

- ***Specific target group***

IMM is developed for a well-defined target group after analyzing characteristics of that group. Content, language, examples, illustrations, explanation and also multimedia inputs (e.g. sound effects, animations, etc.) are designed especially for the defined target group. This, therefore, is felt relevant and appealing to its users.

- ***Specific objectives***

Terminal objectives as learning outcomes are specified as a first step towards the development of IMM. It is followed by developing evaluation tools to assess learning with reference to these objectives. Defining objectives, thus, ensures reliable learning results.

- ***Content in small chunks***

IMM presents content in the form of small steps at a time. One or more than one frame presents a small concept and proceeds only after assuring comprehension of that concept, information or skill. This step-wise learning helps learners to attain mastery over the content. The content is sequenced using various maxims of teaching, viz. from simple to complex, concrete to abstract, etc. which help in better conceptualization and higher comprehension.

- ***Learner-controlled and adaptive mode***

IMM is a strategy for individualized learning. It can provide optimum control to the learner. It can be designed in such a manner that progressing to the next step, moving backward, speed of audio, selection of modules, selection of multimedia inputs like audio, video, navigational sequence and even the mode of learning (presentation or simulation or drilling) can be controlled by the learner. It can be, therefore, adaptive in addressing several learning styles and modalities. Some of the learning style and modalities are discussed as follows:

Interactivity and interaction IMM is also an activity oriented towards strategy seeking frequent and unambiguous response from the learner at every step. IMM can provide active responses in terms of question-answers, solving quizzes, puzzles, etc. as other non-computerized material may provide. Apart from this, IMM can create creative and experiential learning environment through modelling and simulation mode. So, IMM can reach higher level of interactivity with the use of technology.

Immediate feedback and reinforcement: Being an electronic device, IMM provides immediate confirmation of every response of the students. A well-designed IMM provides corrective feedback to the students which help in effective learning. Reinforcement techniques with attractive multimedia strategies enhance the motivation level and the sense of accomplishment at every step. IMM may also arrange for clues, help, and instructions for explorations and ultimately reward the student for her/his adventures.

Validated programme: IMM is generally prepared for wider use and, therefore, needs to be validated. IMM also generally covers optimum content

with adequate information, extensive illustrations and wider scope of practice. Empirical validation of IMM assures the accuracy of information.

To summarize the above discussion, Interactive Multimedia (IMM) as a self-instructional mode possesses some characteristics, which are similar to the characteristics of self-learning units (print) in open learning. They are:

- Specific target audience.
- Behavioural objectives.
- Contents presented in small steps/chunks.
- Content is sequenced using maxims such as from simple to complex, concrete to abstract for better understanding of students.
- Interactivity/Interactive devices such as activities, question-answers, quizzes, puzzles are provided at every step.
- IMM provides optimum control to the students. It is designed with navigation facility, access to sub-modules, selection and speed of multimedia inputs like audio, video and progressing to the next step. (source MDE-418, Block-03, Page 75)
- Feedback and reinforcement.
- In IMM, the mode of learning can be controlled by the student.
- The mode of learning are:
 - Tutorial
 - Drill and practice
 - Game
 - Simulation
 - Problem solving
 - Dialogue
 - Presentation

Check Your Progress 2

- Notes:** a) Write your answer in the space given below.
b) Compare your answer with the one given at the end of this unit.

Compare the characteristics of IMM with those of self-learning materials (SLM) in print form. Explain the differences in both the forms.

.....

.....

.....

.....

.....

.....

.....

19.5.2 IMM as an electronic medium

Here, we will discuss three-characteristics that distinguish IMM from other forms of media used in open and distance education and training. These are the following:

Automatic and versatile device

A computer is a system having different functions such as data storage, processing and retrieval of data and automation to make IMM more effective and efficient. It can be described as automation of the teaching-learning process which allows for unlimited scope for re-learning, practicing and instant data retrieval.

Multimedia elements

Multimedia inputs such as graphics, animations, sounds, and video inputs make IMM motivating which arouse and maintain students' interest. It can be more informative and elaborative too. Being a combination of media, IMM becomes self-explanatory and appealing to more than one sense. It can create a virtual world for students to design, explore and experiment. For example, working with microscopic elements, three-dimensional objects, experiments involving risks (laboratory safety), universal objects, complex, processes, can be made available through IMM.

Advanced technology

Advanced technologies such as internet, videoconferencing, and digital video add to the effectiveness of IMM; multimedia CD-ROM can provide easy access to the wealth of support material such as net-based archives, museums, databases, reviews, glossary, etc. When combined with web-based learning, it can also provide for synchronous and asynchronous communication modes such as discussion forums, e-mail and bulletin boards, which facilitate on line distance learning.

Check Your Progress 3

- Notes:** a) Write your answer in the space given below.
b) Compare your answer with the one given at the end of this unit.

Discuss the characteristics of IMM as an electronic mode.

.....

.....

.....

.....

.....

19.6 DESIGNING OF IMM

Let us now discuss the process of preparation of interactive multimedia. Two major steps are involved in this process: (i) to prepare an instructional design (ID); and (ii) to transfer the ID using software. Let us elaborate these aspects.

There are many theories and models of instructional design which guide a prospective instructional designer to design IMM. If these models are analyzed, we get five phases which are common to all. These phases are:

- Analyze
- Design
- Develop
- Implement
- Evaluate

This is also known as the ADDIE approach. (see Figure 19.1).

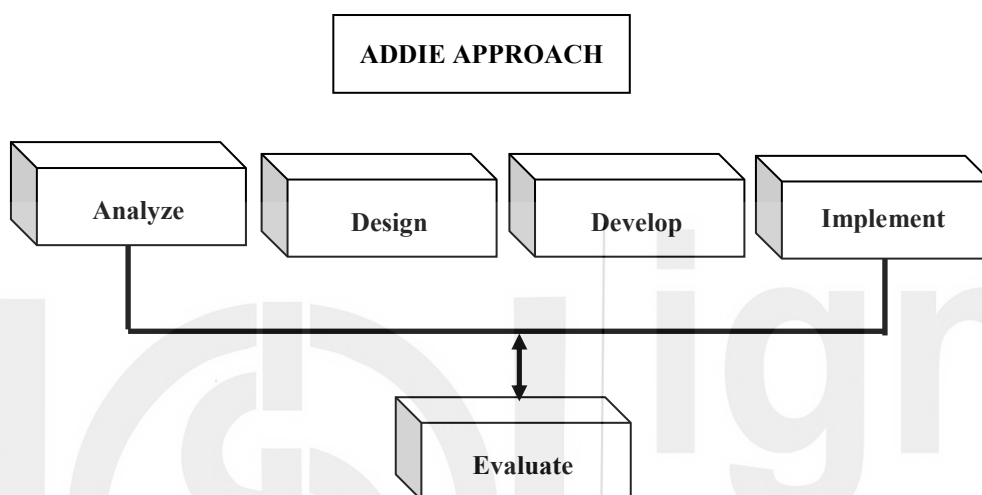


Figure 19.1: The ADDIE approach

(Source: IGNOU Study materials, MES-056, Educational Technology, Block-4)

Let us discuss each phases of in ADDIE approach in detail and see how an effective IMM can be developed for students.

19.6.1 *Analyze*

This is the first step which is very crucial in instructional design. The designer gets acquainted with the learners as well as the content to be taught, and prepares the learning objectives. The pertinent questions for this phase are:

- Who is the audience?
- What do they need to learn?
- What is the budget?
- What are the delivery options?
- What constraints do exist?
- What should the project be completed?
- What will students do to determine their competency?

This set of questions leads to three sub-steps in 'Analysis'. These are:

1. Content analysis: For analyzing the content, one may identify the facts, concepts, procedures, principles from the selected content.
2. Analysis of learner profile: The learner profile may concentrate on the entry behaviour of the learner in terms of the knowledge base, skills as well as attitude towards a particular content.
3. Identifying objectives: For preparing objectives the instructional designer may use Bloom's Taxonomy or Gagne's Learning Outcomes or any other classification of objectives. Specifying objectives using Magerian theory (i.e. use of Performance, Criteria and Condition) is helpful as these specifications are measurable and attainable. (see Unit 13, Block 3)

19.6.2 Design

The second phase is that of designing the instruction. This phase has the following three sub-stages:

1. Selection/preparation of evaluation strategies
2. Development of alternative models
3. Selection of the most appropriate model.

The specific objectives are already prepared in the analysis stage. Now, at this stage, the designer selects the appropriate evaluation strategies. The evaluation strategies are criterion referenced and one may use the mastery learning approach (having criteria like minimum 80% of the mastery by all learners or at least 80% of the learners).

In order to achieve the stated objectives, other variables like instructional strategies, instructional media, and other support services will have to be taken into consideration. There could be many possible combinations; and, hence, in this stage the instructional designer develops alternative models. For example, if the objective is that the learner will be able to classify print and electronic media (see table 16.9 Classification of Media), then this could be achieved through inclusion of description and examples of different print and electronic media. Similarly, the instructional media to be used for particular strategy will also change. The instructional designer will have to prepare alternative formats using instructional media. After developing the alternative formats, the designer selects the one which is more appropriate, and more feasible. This format is then developed fully in the third stage, which is as follows.

19.6.3 Develop

This is the crux of the instructional design for interactive multimedia. The following sub-stages are generally used in the process of developing the product which had been selected at the end of the second phase of 'design'.

- Detailed content analysis and content generation
- Preparation of concept map
- Preparation of achievement tests
- Preparation of entry behaviour test
- Selection of appropriate mode of IMM
- Selection of instructional strategy
- Selection of media
- Story board writing
- Preparation of prototype on computer

The content is analyzed thoroughly for all the categories (e.g. facts, concepts, principles, and procedures (see Unit-6,Block-2) as suggested by David Merrill (1983) or other learner characteristics such as: verbal information, intellectual skills, motor skills, cognitive strategies and attitudes as learning domains(Unit 12,Block-3) suggested by Gagne (1972). The content is, then, arranged in a flow showing the relationship of various content points. This may be shown as a flowchart (see Figure 19.2). The Menu page of the packages generally shows the available content.

For example, let us take a concept of ‘Communication’ to prepare the flow chart.

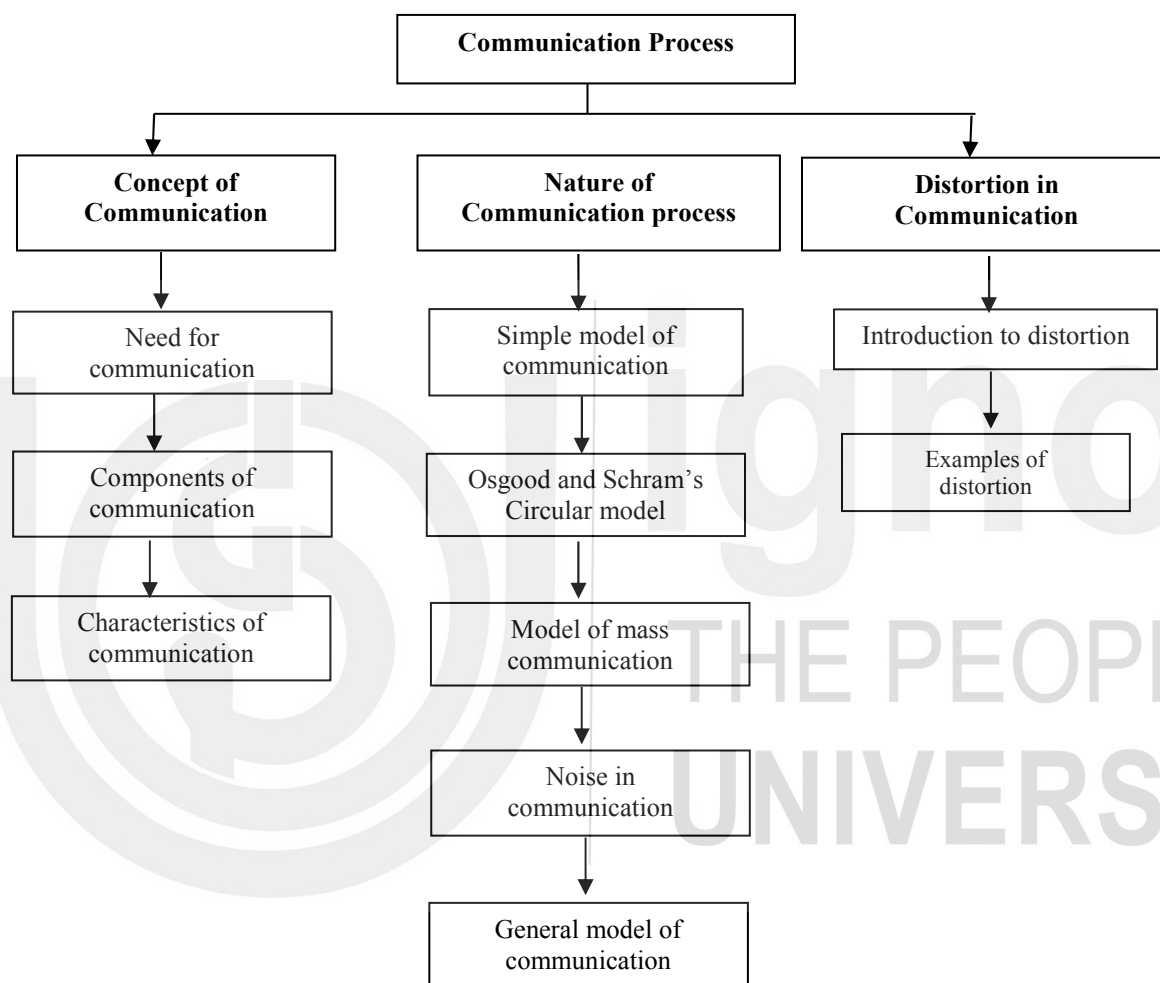


Figure 19.2: The menu and the flow chart showing the contents

(Source: IGNOU Study materials, MES-056, Block-04)

The designer selects the appropriate mode (tutorial, drill and practice or simulation or a combination of these) suitable to the content and objectives. He/she takes also care of the following aspects:

Story board writing

The instructional designer then proceeds to write the story board. Story board is a set of frames along with precise instructions to the multimedia designers. Here, though the whole content unfolds sequentially frame by frame, the student need not follow the same sequence. The ‘Menu’ allows the learner to select the topic or sub-topic or a sub-part as per his/her preference. Most of the interactive multimedia offers lots of flexibility and control to the learner in many aspects.

Graphic design

Once the story the board is complete then it is sent to the team of graphic designers. By using soft wares like Flash or and Visual Basic the programmers of graphic designers design the whole package is designed. For design of graphics in IMM, see Figure 19.3

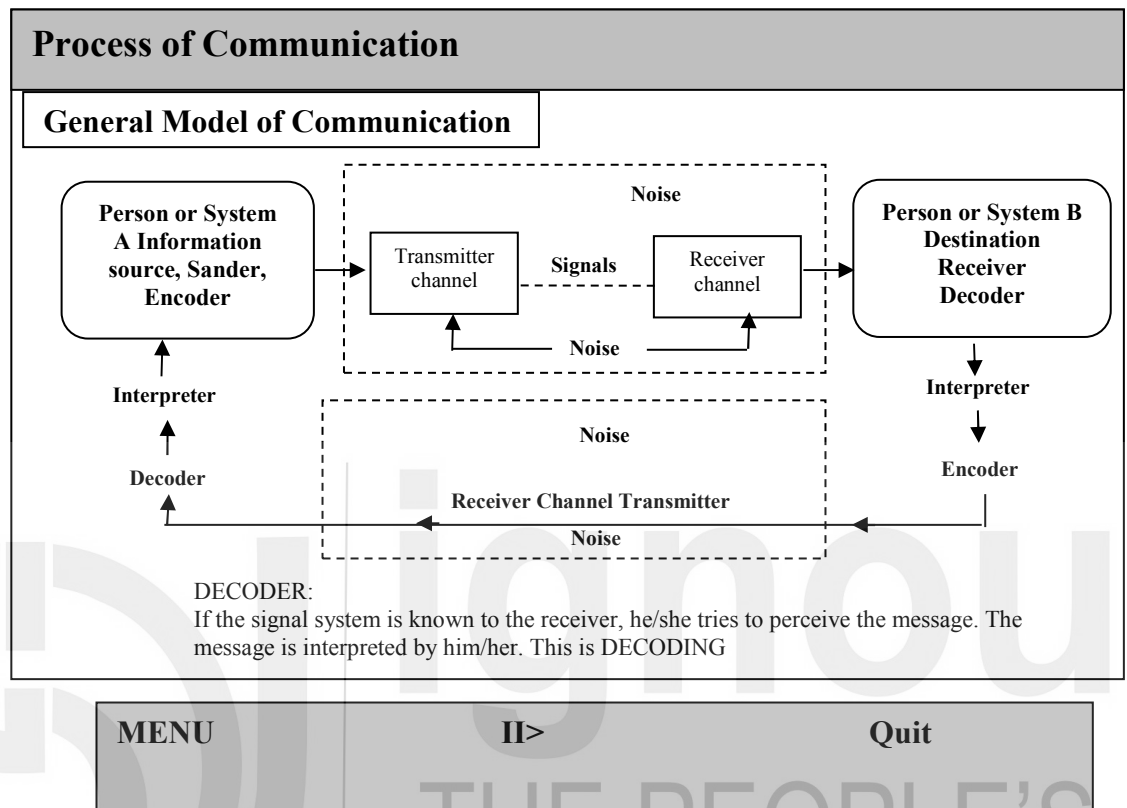


Figure 19.3: Graphics in IMM

(Source: IGNOU Study materials, MES-056, Block 4)

Review

At the end of this phase the prototype of IMM is ready to be validated. Two types of processes are generally used for validation; one is establishing content validity, and the second is field or pilot testing.

Development of IMM is a team effort, and during the design phase the subject matter expert is a member in the team. But once the package is ready, it is reviewed by the content experts as well as graphic experts. This process of reviewing points out the weaknesses in the package and provides feedback for further improvement. The improvements based on the feedback are made before field testing is conducted.

Field testing

The pilot test of the multimedia based course takes place before the official implementation. It provides the teaching-learning specialists a final chance to review the course prior to its official launch.

The subject matter experts must ensure that the course materials are accurate and complete. However, clear instructions should be provided to locate a learning activity. Students who learn the multimedia course material provide candid feedback.

Additionally, at the end of the course, you can measure how well the pilot course's learners have achieved the courses learning objectives. Pilot testing is, thus conducted on a small group of learners from the target population. Their feedback as well as achievement on the post-test helps the designer to make necessary modifications in the package. After this process the package is ready for use.

19.6.4 Implement

The implementation phase refers to the actual delivery of the instruction. The purpose of this phase is the effective and efficient delivery of instruction. This phase must promote the students' understanding of material, support their mastery of objectives, and ensure their transfer of knowledge from the instructional setting to the job. The instructional strategies which looked good during the 'development' stage may show some drawbacks during the stage of implementation. One has to be more flexible in using the courseware and making meaningful observations. This phase helps to refine the courseware further.

19.6.5 Evaluate

Evaluation is a very essential component of the development process of IMM. There are two types of evaluation: Formative Evaluation and Summative Evaluation. In every phase of multimedia preparation, there should be formative evaluation.

Formative evaluation

It is done during each step of the ADDIE approach so as to improve the quality of each step. The result of the formative evaluation of each phase leads the designer back to a previous phase. The end product of one phase is the starting product for the next phase.

Summative evaluation

It only occurs after the package is launched. When the IMM package is launched, it is not the end of the process. The ADDIE approach requires a final review too. During the evaluation phase, the specialist measures how well the package achieved its goals.

Kirkpatrick (1996) presented a four-level model of evaluation (see Unit 15, Block-03) that has been used to evaluate the design products and training programme. The four levels of evaluation model can be used to judge a multimedia package also. These levels are:

- Level One: Reaction
- Level Two: Learning
- Level Three: Behaviour
- Level Four: Results

The following questions can be asked to collect information for a multimedia package. These are:

- Do the learners like the package?
- Do the learners achieve the learning objectives at the end?
- Do the learners change their behaviours in the workplace?
- Does the course help the company achieve its business goals?

For some questions, it's fairly easy to collect information. You can find out the learners' opinions about the course through a short survey immediately after the course is launched. A pre-test and post-test analysis can suggest how well learners achieved the learning objectives. However, it takes more time and effort to measure changes in workplace behaviours and improvement towards business goals. In both cases, you can't measure these results immediately. You want to measure the long-term improvements rather than the immediate results. Therefore, the evaluation phase can extend for months.

Let us summarize the phases, tasks and output components that constitute the instructional design for multimedia using ADDIE approach in a tabular form.

These are as follows:

Phases	Tasks	Output
Analysis: The process of defining what is to be learnt	• Need assessment • Problem identification • Task analysis	• Learner profile • Description of constraints • Needs, problem statement • Task analysis
Design: The process of specifying how it is to be learnt	• Write objectives • Develop test items • Plan instruction • Identify resources	• Measurable objectives • Instructional strategy • Prototype specifications
Development: The process of authoring and producing the materials	• Work with producers • Develop workbook, flowchart, programme	• Storyboard • Script • Exercises • Computer assisted instruction
Implementation: The process of installing the project in the real world context	• Teacher training • Try-out	• Student comments, data
Evaluation: The process of determining the adequacy of the instruction	• Record time data • Interpret test results • Survey of students • Revise activities	• Recommendations • Project report • Revised prototype

Check Your Progress 4

Notes: a) Write your answer in the space given below.
b) Compare your answer with the one given at the end of this unit.

Discuss the ADDIE phases used for designing multimedia.

.....

.....

.....

.....

.....

19.7 LET US SUM UP

In this Unit we discussed various characteristics of interactive multimedia. Teachers, course writers and educators should make use of appropriate multimedia courseware in open and distance learning. We have discussed different characteristics of IMM courseware. This would help you to design an IMM and also make a choice in your selection of media components.

As a course writer you may be interested in developing IMM by yourself. We have said that the development of IMM is a team work. You, as a course writer would definitely play a responsible role. i.e. that of Instructional Designer in the team. In this unit we have tried to give you an overview of the whole process of the development of IMM through an approach called ADDIE. You may devise your own mechanism of developing IMM for the subject area you prefer to develop for the specific courses/programme or different level of students.

19.10 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress 1

The four levels of interactivity are object interactivity, linear, hierarchical & reflect.

Check Your Progress 2

Please see sub-section 19.5.1.

Check Your Progress 3

The characteristics are automatic and versatile device, multimedia elements, and advanced technology (Please see sub-section 19.5.2).

Check Your Progress 4

The phases are analyze, design, develop, implement and evaluate (Please see sub-section 19.6.1).

UNIT 20 INSTRUCTIONAL DESIGN IN E-LEARNING

Structure

- 20.1 Introduction
- 20.2 Learning Outcomes
- 20.3 What is e-Learning?
- 20.4 Designing e-Learning Courses
- 20.5 Phases of Designing e-Learning Courses
 - 20.5.1 Analysis
 - 20.5.2 Design
 - 20.5.3 Development
 - 20.5.4 Implementation
 - 20.5.5 Evaluation
- 20.6 Rapid Instructional Design and Rapid e-Learning
- 20.7 Let Us Sum Up
- 20.8 Check Your Progress: Possible Answers

20.1 INTRODUCTION

In Unit 19 of this Block, you have gone through the phases of ADDIE approach for preparing interactive multi-media. The five phases i.e. analyze, design, develop, implement and evaluate, are also used in designing e-Learning courses.

Instructional design is a systematic process to planning and producing effective instructional materials. It is based on theories of learning and instructions and ensures the quality of instruction. Instructional design offers a blueprint for course designers to shape learning content and create the conditions for improved performance and effective transfer of knowledge. The e-Learning courses need to be designed to stimulate learners to integrate and coordinate required skills, knowledge, and attitudes in such a way that these can be transferred to real-life conditions without the help of a teacher.

This unit is designed to help you apply the phases of designing to the creation of e-Learning courses. The Unit begins by giving an overview of e-Learning and its features. It explains the e-Learning design process, using the ADDIE approach of instructional design (Ref. Unit 11, Block-3), which provides a systematic, step-by-step approach to designing and then improving effective and objectives-based instruction. The importance of reusable learning objects and its design process for creating e-courses are also elaborated. The unit ends with a discussion on rapid instructional design and rapid e-learning.

20.2 LEARNING OUTCOMES

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

- explain the concept and features of e-Learning;
- describe the various steps involved in designing e-Learning courses;
- discuss different phases of designing e-Learning;
- explain how the learning objects are designed and developed;
- identify the criteria for defining rapid e-learning.

20.3 WHAT IS E-LEARNING?

Many terms have been used to define e-Learning like **web-based instruction**, **computer-based learning** or **web-based learning**, and **online learning**. E-learning can be CD-ROM-based, Network-based, Intranet-based or Internet-based. It can include text, video, audio, animation and virtual environments. It provides rich learning experience to a large number of students due to the developments in Web 2 technologies (forum, wiki, blog, podcast, etc.).

Let us discuss a few definitions of e-Learning.

- **Definitions of e-learning**

Web-Based Instruction: It is a “hypermedia based instructional programme which utilizes the attributes and resources of the World Wide Web to create a meaningful learning environment where learning is fostered and supported” (Khan, 1997).

Virtual Learning: “The educational process of learning over the Internet without having face-to-face contact is known as Virtual Learning” (French, et al., 1999).

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

E-learning: It is a broad term in compassing a wide variety of electronic technologies used for educational purposes, and a wide variety of educational for and designs (Bates and Poole, 2003; OECD, 2003; and Allen and Seaman, 2008). It covers a wide set of applications and processes including computer-based learning, web-based learning, virtual classroom, and digital collaboration

E-learning incorporates all educational activities that are carried out by individuals or groups working online or offline, and synchronously or asynchronously via networked or standalone computers and other electronic devices (Som Naidu 2006).

E-learning involves the use of a computer or electronic device (e.g., a mobile phone) in some way to provide training, educational or learning material. (Derek Stockley, 2003) (See Block-2, Unit-9 of Course MDE-518).

- **Features of e-Learning**

E-learning has definite benefits over classroom instruction. The most obvious are the flexibility and the cost savings benefits that results from not having to travel or spend excess time away from work. These features are:

- Self-paced
- Self-directed
- Anytime-anywhere learning
- Faster-learning
- Less-expensive
- Collaborative learning

Let us discuss these features in detail.

- E-learning is **self-paced** and gives students a chance to speed up or slow down as necessary. This feature takes care of the individual differences which is not possible in traditional classroom.
- E-learning is **self-directed**, allowing students to choose content and tools appropriate to their differing interests, needs, learning styles and skill levels. Most of the e-Learning courses are developed keeping in mind the learning theories where the focus is on the student.
- **Anytime anywhere learning** feature of e-Learning has revolutionised the training world. In e-Learning geographical barriers are eliminated, opening up broader education options. As e-Learning is available via the Internet, one can access courses anytime, anywhere that has Internet access. The 24/7 accessibility makes scheduling easy and allows a greater number of student to attend classes.
- **Faster learning** e-Learning courses can progress faster than traditional courses because of the individualized approach. It allows learners to skip content they already learnt and understand and move onto the issues for need training. Moreover, the multimedia based authentic learning environment of e-Learning helps one to understand the concept much more easily than traditional approach.
- It is **less expensive** to produce an e-Learning course with the use of reusable learning objects (RLO) and the course can be **updated easily** and quickly using a RLO. Online e-Learning sessions are especially easy to keep up-to-date because the updated materials are uploaded to the web server.
- It can be **easily managed** for large groups of students. With the use of powerful Learner Management Systems (LMS) the delivery, tracking and assessment of learners are automated.
- **Collaborative learning:** Technology tools, specifically the Web2 make collaboration among learners much easier. Since many of the e-Learning projects involve collaborative learning, the online environment is suitable for collaborative learning that allows a shared understanding and knowledge construction.

Check Your Progress 1

Notes: a) Write your answer in the space given below.

b) Match your answer with the answer given at the end of this Unit.

Describe the features of e-Learning.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

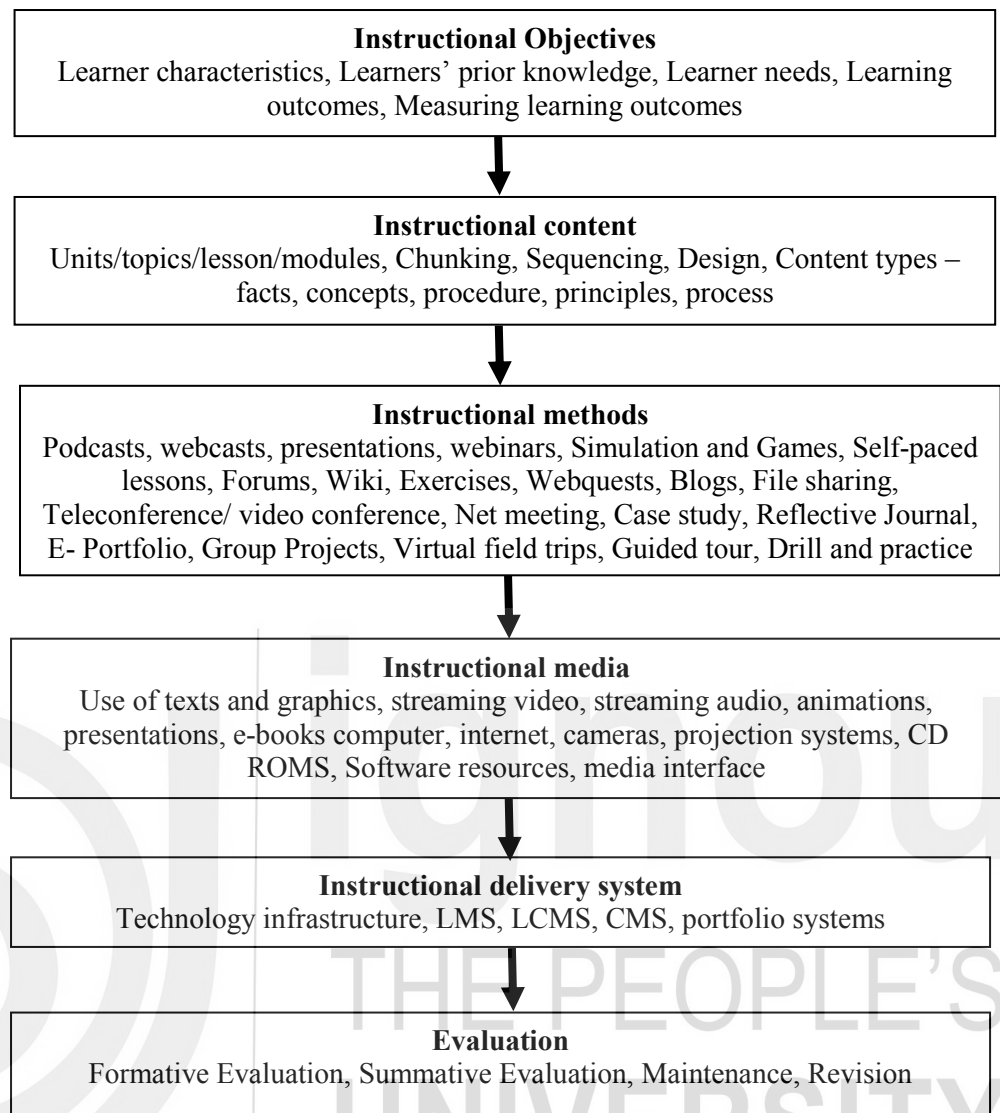
20.4 DESIGNING E-LEARNING COURSES

The integration of technology in e-Learning has taken over many of the human functions, making us think differently about the instructional design aspect of e-Learning courses. Though many aspects of traditional design will remain the same for e-Learning, one must go beyond those approaches to ensure that a proper blend of technology and instruction happens in e-Learning design. By adopting the theories and models of instructional design, we can avoid many of the problems often experienced by those who need to use new technologies in open and distance learning. According to Mishra (2002) an eclectic Model of e-learning covers behaviourism, cognitivism and constructivism, these learning theories in the context of e-learning are the basics to identify the instructional approaches to be used. (See Table 9.3: Approaches to instructional based on Vellabiba and Romiszoski (2001) of Unit-9, Block-2, Course MDE-518. The instructional design model for e-learning environment can consider the students, the subject and learning outcomes desired in the students to create the courses and programme.

However, it is learning, not technology which is to be kept at the centre of e-Learning development. Fig. 20.1 gives the essential elements to be considered while designing an e-Learning course.

There are many models for designing instruction as discussed in Block-2, Unit-5. Instructional design models may range from prescriptive, behaviourist presentations to more free-flowing constructivist forms. {Ref. Unit 5 of Block-2, Course MDE-412}

Fig. 20.1: Designing an e-Learning Course



Some of the common models used for designing e-Learning are the Dick and Carey Model and the ASSURE Model. Before going to the next section please go through Unit 5, Block-2 of this course pertaining to different types of theories and models of instructional design.

Check Your Progress 2

Note: a) Write your answer in the space given below.

b) Match your answer with the answer given at the end of this Unit.

Explain the essential elements considered while designing e-learning.

.....

.....

.....

.....

.....

.....

20.5 PHASES OF DESIGNING E-LEARNING COURSES

You have learnt about the application of ADDIE approach, (Unit 11, Block-03), Dick and Carey model and ASSURE model (Unit 5 of Block-02). These theories and models have implications for designing e-Learning.

The various phases which create a structured and effective flow that guides and controls designing e-Learning, are analyze, design, develop, implement and evaluation (ADDIE approach).

Let us discuss each phase of designing steps involved in instructional design for e-Learning. These are:

20.5.1 Analysis

The analysis phase identifies the learners' needs, learners profile, tasks, context and learning needs. This is the first and most crucial phase because the findings guide the entire process of designing. Analysis involves gathering information about the need of the content, learning environment and learners.

20.5.1.1 Needs Analysis

Needs Analysis is the process of identifying and evaluating needs. The main purpose of the need assessment is to identify the necessity of the desired learning outcomes of the course or a training programme. The information obtained from needs analysis can be used for defining program goals. These goals can then be stated as specific teaching/learning objectives, which in turn will function as the foundation on which to develop unit/lesson plans, materials, tests, assignments and activities. Needs analysis can be very formal, extensive and time consuming, or it can be informal, narrowly focused and quick. Some questions like the following will help in deciding the need of the courses or programme.

- What is the necessity of the educational or training programme?
- What are the specific knowledge/skills the learner needs to acquire?
- Any other courses of this nature already exist?
- Is this course a replacement or addition to an existing one?
- How often will the course or training content change?
- Is this course suitable for online delivery?
- How soon do the learners need the skills or knowledge from this course?

20.5.1.2 Learner Analysis

Information obtained from learner analysis will help to tailor the instruction to specific needs of learners. This helps the course designer to decide the difficulty level of the content and delivery methods that suit the learning styles of learners. Questions related to background information of the learner, when and where they want to learn software and hardware resources available with the learner, their prior knowledge, the technology competencies that they possess, their possible expectations from the course,

access internet and the band width will guide the learner analysis. The key to instructional design is to work around the participants rather than the content alone. The information from the learner analysis helps to create a course that focuses on learners' actual needs.

20.5.1.3 Content Analysis

Content analysis is "the process of breaking large bodies of subject matter or tasks into smaller and instructionally useful units. Its purpose is:

- to identify and isolate a single idea or skill units for instruction,
- to act as an objective decision rule for including or excluding topics from instruction, and
- to provide guidance for sequencing topics in instruction.

The result of this analysis will "provide the basis for preparing performance objectives which in turn will guide the development of instruction and test items".

Outlining the course content will also help you decide the delivery options. Content analysis will also help in identifying the structure of the course, duration of the course, duration of each modules/lessons, fully online or blended approach.

It is also necessary to identify whether a content can be used as a whole or only a part of it i.e. with modifications. With Reusable Learning Objects (RLO) gaining popularity it is not hard to find content that could be re-used. If you find content (RLO) which is suitable and compliant with the standards specifications, of the course then re-use can save lot of time and resources. If you find content that you think can be re-used or re-purposed, see if the content's Learning Objectives align with your needs analysis. In some cases the RLO could be re-used as it is and in other you may have to modify it.

20.5.1.4 Technical Analysis

The purpose of technical analysis is to establish the baseline technical capabilities and requirements and thereby estimate the development cost, efforts and implications. It is very important to decide what the minimum technical capabilities and requirements will be to develop and participate in the course or training.

Establish the following issues before you design the instruction.

- Establish minimum standards including processors, memory, hard drive space, hardware (CD ROMs, DVD capability, speakers, microphones, etc.), software (browsers, word processors, FTP, plug ins, video viewers, etc.), and bandwidth for the learner and the instructor. This will imply restrictions in choice of media and tools.
- Decide the e-Learning tools necessary to develop the course including all software and hardware; their cost, availability and suitability.
- Hardware and software requirement of the server. The online course should be hosted on a fast, reliable server, with a high bandwidth connection.

- The learner management system that will be used to create the virtual learning environment and what are its features?
- The number of people that will be required to develop the course and their competencies?

A list of tools needed for e-Learning is given below in Box 20.1:

Table 20.1

Content creation tools • Tools for creating avatars (virtual characters) • Course and lesson authoring tools • E-book tools • Graphics and animation tools • Image galleries and sound effects libraries • Assessment tools • PDF tools • Video and simulation tools • Web page authoring tools • Survey and polling tools Delivery and distribution tools • Podcasting tools • RSS tools • Web casting and streaming tools • Presentation tools • Mobile learning tools User tools • Operating system • Browsers • Media players • Plug Ins • PDF reader • Word processor	Communication and Collaboration tools • Discussion boards and forum tools • E-mail tools • Live support tools • Meeting and teleconferencing tools • Instant messaging and chat tools • Social networking tools • Social book marking and file sharing tools • Wiki tools E-learning systems • Content management systems • Learning management systems • Course management systems Hardware tools • PC/laptop/ net book • Smart phones/ palmtop computer • Printer / scanner/ speaker • Microphone /speaker/ web cam
--	---

20.5.2 Design

The design phase follows the outcomes of the analysis phase and the outline of the course content is developed at this phase. The findings from the design phase are collected and maintained in the design document.

20.5.2.1 Writing Learning Objectives

A learning objective is a statement of what the learners will be expected to do once they have completed a specified course of instruction. It prescribes the conditions, behaviour (action), and standard of task performance for the course. The objective is sometimes referred to as performance or behavioural objectives. The analysis done earlier will help you to formulate the objectives that are achievable for the e-Learning course (See Block-3, Unit-13).

20.5.2.2 Entry behaviour

The learner's performance should be tested to determine if their entry behaviour (Knowledge, Skills, and Abilities) match the proposed level of instruction. It is crucial to assess entry behaviours and to set appropriate pre-

requisites. Adequately assessing entry behaviours and prior knowledge is essential for achieving the goals and objectives set for the instruction. To assist you in determining the entry behaviours refer to the information you obtained in the audience analysis stage them to consider what needs to be learned through for the course. You are designing an online course for which computer literacy will be essential. Assess the learners' capability to use of technology and determine what minimum standards should be required.

20.5.2.3 Instructional Strategy and Learning Objects

Having developed objectives, it is necessary to devise an appropriate instructional strategy to maximize learning. Among the things to consider are different instructional methodologies, techniques to reinforce and remediate, and the exploration of different motivational techniques.

The current trend in online teaching make use of **reusable learning objects**. Each learning object consists of an objective, instructional content (including appropriate media), mechanisms for assessment of the instruction, and references.

- **Structure and Component of Learning Objects**

The structure and composite nature of a learning object are: interpretation. Content models provide a framework for defining the structure, that is, the level of aggregation/granularity of learning objects. Cisco Systems (http://www.e-novilia.com/materials/RLOW_07_03.pdf) proposed in 2003 suggested five aggregation levels for structuring learning content:

- Subtopic
- Topic or RIO (reusable information object)
- Lesson or RLO (reusable learning object)
- Module
- Course.

Let us discuss a learning object in detail.

A course is comprised of a collection of modules, which in turn include collections of lessons. A lesson can be re-usable in multiple courses and learning contexts. A lesson or re-usable learning object consists of a single learning objective, an overview, a summary, and a collection of topics (or RIO), as well as practice activities, assessment, and metadata. In particular, five to nine re-usable information objects can be combined to form a learning object (Barron, 2002). A topic is a self-contained re-usable information object that consists of subtopics (such as small chunks of information of various types such as definitions, examples, tables, guidelines, etc.), assessment, practice activities, and metadata. Topics are grouped into five category types, including concepts, facts, procedures, processes, and principles. Both RLO and RIO components (such as content, activities, and assessment) can be represented in various media formats such as text, audio, animation, videos, Java code, applets, and other delivery media (Cisco Systems, 2003b; 2003a). It is worth mentioning, however, that although Cisco initially treated a single lesson as a learning object, for the purpose of terminological simplicity, Version 4.5 of the strategy regards each aggregation level (from topics to courses) as a learning object (Cisco

Systems, 2003b). This revision, however, broadens the scope of a learning object and does not specify its exact position in the course hierarchy as it did previously. (Ref. Course MDE-418, Block-04 Units 19).

Instructional strategies for designing e-Learning

The following are some of the instructional strategies that can be used in e-Learning.

- **Information presentation:** The web pages display textual as well as graphical information for the learners. Audio-video based learning materials can also be provided to the learners on the web page.
- **Decision-making:** Computer and web technologies allow learners to take their own decision to follow the links provided on the pages. The learning environment can be customized for individual needs based on learner's decision to take course/module/units. The learners can also decide on the kind of interface (graphical and/or text-based).
- **Guidance and Collaboration:** E-mail and online asynchronous discussion group facilitate collaboration on the web. Using e-mail, the learners can interact with the tutor. Similarly, learners can collaborate through discussion groups to discuss and debate various aspects of the curriculum.
- **Drill and Practice:** Like computer assisted learning, e-learning also provides drill and practice opportunities. Using formative assessment techniques in the course content presented in small chunks can lead to optimized learning.
- **Feedback:** As we understand, feedback is an essential component of the overall learning process. Learners can receive automated feedback for assignments, and during interaction with formative assessment tools in the web pages. Tutors can also provide e-mail based feedback to learners with a human touch.
- **Reflection:** Using the asynchronous discussion tools, learners can reflect on ideas and steps held by other learners, as well as on real life events and express it.
- **Articulation and Creation:** When the learner is reflecting someone else's idea, he/she is also trying to articulate his/her own thought in writing. There by the learner engages in deep thinking and creates new knowledge embedded in a social and meaningful context.
- **Discovery:** The web provides an opportunity to the learner to discover new learning resources on the web. Inclusion of search facility on the learning site can facilitate this or the student can use other search tools. The emphasis here is on promoting independent learning and evaluating the quality of information that one gathers through web searches. (Wikinson et al. 1997)
- **Assessment:** With the emphasis on self-directed learning and learner autonomy, the learner tries self-assessment. So, learner assessment is of greater importance than assessment by tutors/teachers. However, the web provides opportunity for speed, and power test for objective type questions. Electronic assessment of essay type questions is also now possible to bring objectivity into the evaluation process (Swartz, 2001).

20.5.2.4 Media utilisation

To make e-Learning efficient the delivery of instructional content using appropriate instructional media is important. The appropriate selection of instructional media to support e-Learning is not intuitive and does not result from personal preference. Utilizing a systematic approach to media selection ensures that appropriate instructional media are employed to support desired learning objectives. Instructional goals should drive media selection, application, and the course development process. Characteristics of the distance learner and the impact of technology on instructional processes are also important considerations in instructional media selection and course development.

20.5.2.5 Design learner assessment and course evaluation

Design of the student assessment strategies and evaluation components of an e-Learning course is an integral part of the design process. This has a positive role in a course or training. The goal should be to evaluate the learners' level of achievement of each objective and to provide constructive feedback and remediation where ever necessary. Online tests make use of testing software useful for creating visually appealing creative test items in multiple formats. The test generated by these softwares typically consists of:

- Test questions of different formats
- Possible answer choices
- Correct answer and reinforcement/feedback
- Wrong answer and remediation/feedback.

The test generated using stand-alone software can be integrated with the LMS to generate grade sheet and record keeping for individual student. Course designers should exploit the interactivity e-Learning, to embed opportunities for self-assessment. Most LMS have a testing tool. For example, Moodle testing tools can create and grade multiple choice, fill in the blanks, matching, short answer, and even essay items. Another approach to assessment is the authentic assessment which can be done using electronic portfolio. The open source ePortfolio platform like Mahara can be integrated into LMS like Moodle to assess the learners. (Ref. Unit 22, B-5)

Course Evaluation: Evaluating the content you designed and the overall effectiveness of the course is essential to ensure the quality of e-Learning courses. This can be done by providing an opportunity for the learner to evaluate the course or training so that it can be improved. Understanding learner perceptions and obtaining their feedback is essential to the continuous improvement process. Many LMS has this feature inbuilt into it in the form of survey which the students can take for any particular aspects or whole of the course.

20.5.2.6 Design the interface

The user interface is one of the important elements of e-Learning course and it plays a crucial role for providing a meaningful and efficient experience to the learners. The learning effectiveness and interface design are substantially intertwined and it is the interface design that the learner constantly interacts with throughout the course. The success of any training program is largely dependent on the student's own motivation and attitude. As such, an interface design can have motivational or de-motivational effects. An appealing

interface can draw the learner to be engaged in the course while a poorly designed interface has them feeling lost, confused, or frustrated, which becomes a barrier to effective learning and information retention. Therefore, spending substantial time on this aspect of e-Learning design can be valuable for learners.

Usability: After developing the interface design it is better to do user testing to verify the design and layout. This user testing should be carryout with the help of those who are not acquainted with the course or were involved in the development. However, getting the users from the target group for whom the course is meant is important. Testing the designed user interface on the end users makes it more user-friendly. Any suggestions by learners can be incorporated and areas that learners find difficult to use can be corrected. No interface design should be finalized without testing it on the target audience to gauge its actual usability.

20.5.3 Development

In the previous sub sections, you have read the analysis and design phases involved in preparing e-learning courses. Planning and deciding about the software to be used and instructional strategies to be followed are the key components for development of e-learning courses.

According to Byunebal (2002), in an e-learning course development process it is important to consider the following:

- Arrange for necessary copy right permissions;
- Focus on the management of instructor-student communication;
- Arrange for usability test;
- Research the minimum hardware/software available to students;
- Identify and arrange for necessary support both for students and instructors, student;
- Develop a plan for assessment strategies and assessing course quality.

The steps involved in the development phase are: Authoring, Storyboard and Prototyping quality assurance;

Let us discuss each phase pertaining to development of an e-learning course.

20.5.3.1 Authoring

Based on the information obtained through the prior phases, you can start authoring the content. Take each learning objective and write the lesson for fulfilling it. If you are co-authoring, it might be good for you to use an authoring template. This will help authors to use as uniform format which in turn makes it easier for the content to be presented in a consistent style. E-learning development entails much more than designing appealing modules for your content with the latest authoring program. Effective development will include less popular elements such as coding, standards, and accessibility.

There are several authoring choices - Macromedia Flash, Dream Weaver, Authorware, macromedia breeze, captivate, and director; are authoring tools available. This is not an exhaustive list, as authoring tools have become extremely popular due to the increasing ease of use and the popularity of the effects they can produce in small amounts of time. In addition to these authoring tools one will have to use various media editing tools to create

appropriate audio, graphics, video, and simulations. The instructional design process ensures that your content is conceived, created, and implemented in an instructionally sound manner. Without an instructional design, you may have an attractive yet ineffective product.

20.5.3.2 Storyboarding and prototyping

Storyboards are visual organizers, typically a series of illustrations displayed in a sequence for the purpose of pre-visualizing a video, web-based training, or interactive media sequence. The objective of the storyboard is to describe in detail how the end product would be. Storyboarding is primarily the task of an Instructional Designer. The more detailed the storyboard, the more effective the end result would be. It is important for an instructional designer to be well-versed with the design principles to be able to create a good storyboard. (See Unit 11, Block-03, Course MDE-412)

The disadvantage of using a storyboard for developing online learning is that it tends to limit the final product which ends up being very linear. In addition, many features of online media cannot be easily captured in the storyboard format. It is very difficult to develop a storyboard for database driven learning applications and online learning that has social interaction. For these reasons many instructional designers have shifted to using rapid prototyping as visual representations instead of storyboards. It is wise to test a prototype before full development.

It is best to detect potential problems at this stage of development and address these, then to wait until the development is complete, or worse, until we are getting poor results.

A **Rapid Prototype** is simply a quickly assembled module that can be tested with the student audience early in the Instructional System Design (ISD) process. The evaluation typically looks at things like how well the learners responded to the outline and an actual piece of the design, how effective the learning activities are, and how well the program performs on the chosen technology platform. Based on the feedback, the design can be revised and another prototype can be developed. This iterative process continues until you finally have the complete programme or course. The reasons of Rapid Prototyping are:

- To increase effective communication;
- To decrease development time;
- To decrease costly mistakes;
- To extend product lifetime by adding necessary features and eliminating redundant features early in the design.

Rapid Prototyping decreases development time by allowing quick corrections to a product that can be made early in the development process. Its users are involved in the development process, the system produced is obliged to their needs.

20.5.3.3 Quality Assurance

Quality assurance of e-Learning courses can be based on the following aspects. These are:

- **Content quality:** Veracity, accuracy, balanced presentation of ideas, and appropriate level of detail

- **Learning goal alignment:** Alignment among learning goals, activities, assessments, and learner characteristics
- **Motivation:** Ability to motivate, and stimulate the interest or curiosity of, an identified population of learners
- **Presentation design:** Design of visual and auditory information for enhanced learning and efficient mental processing
- **Interaction usability:** Ease of navigation, predictability of the user interface, and the quality of User Interface (UI) help features
- **Standards compliance:** Adherence to international standards and specifications.

20.5.4 Implementation

Implementation is the fourth phase of instructional design of e-Learning courses.

E-learning can be delivered in three models they are:

1. Using the web as a supplement to face to face instruction;
2. Using the web in a mixed mode with face to face instruction or distance learning; and
3. Using web-based instruction as completely online with no face-to face student-student or student-teacher interaction.

According to French *et al*, (1999) the e-learning environment using web-based instruction as completely online with no face-to-face interaction is useful for both student and teachers as it can facilitate shift from *instructivist* to *constructivist* learning paradigm that represent student directed learning rather than teacher directed learning. (French et al. 1999)

The purpose of this phase is the effective and efficient delivery of instruction. This phase must promote students' understanding of instructional content, support the students' mastery of objectives, and ensure the students' transfer of knowledge from the instructional setting to the work place.

Planning for implementation is important. The implementation plan establishes the implementation timeline and procedures. Some of the implementation issues where the timelines and procedures need to be developed are as follows:

- Establish the time schedule for the course rollout;
- Launch the course, its promotion and marketing;
- Schedule the courses, enrol learners and the management plan for the learners;
- Prepare the learners with instructions, help guides and tutorials ;
- Decide upon the delivery platform and select the learner management systems;
- Decide upon the reporting procedures and allocate the responsibilities;
- Work out the maintenance schedule and plan the upgradation requirement and the frequencies;
- Develop the end user technical support system and implement the same.

Check Your Progress 2

Note: a) Write your answer in the space given below.

b) Match your answers with the answers given at the end of this Unit.

- Describe the steps involved in analysis phase of e-Learning.

.....

.....

.....

.....

- Explain the implementation issues that are involved in designing e-Learning.

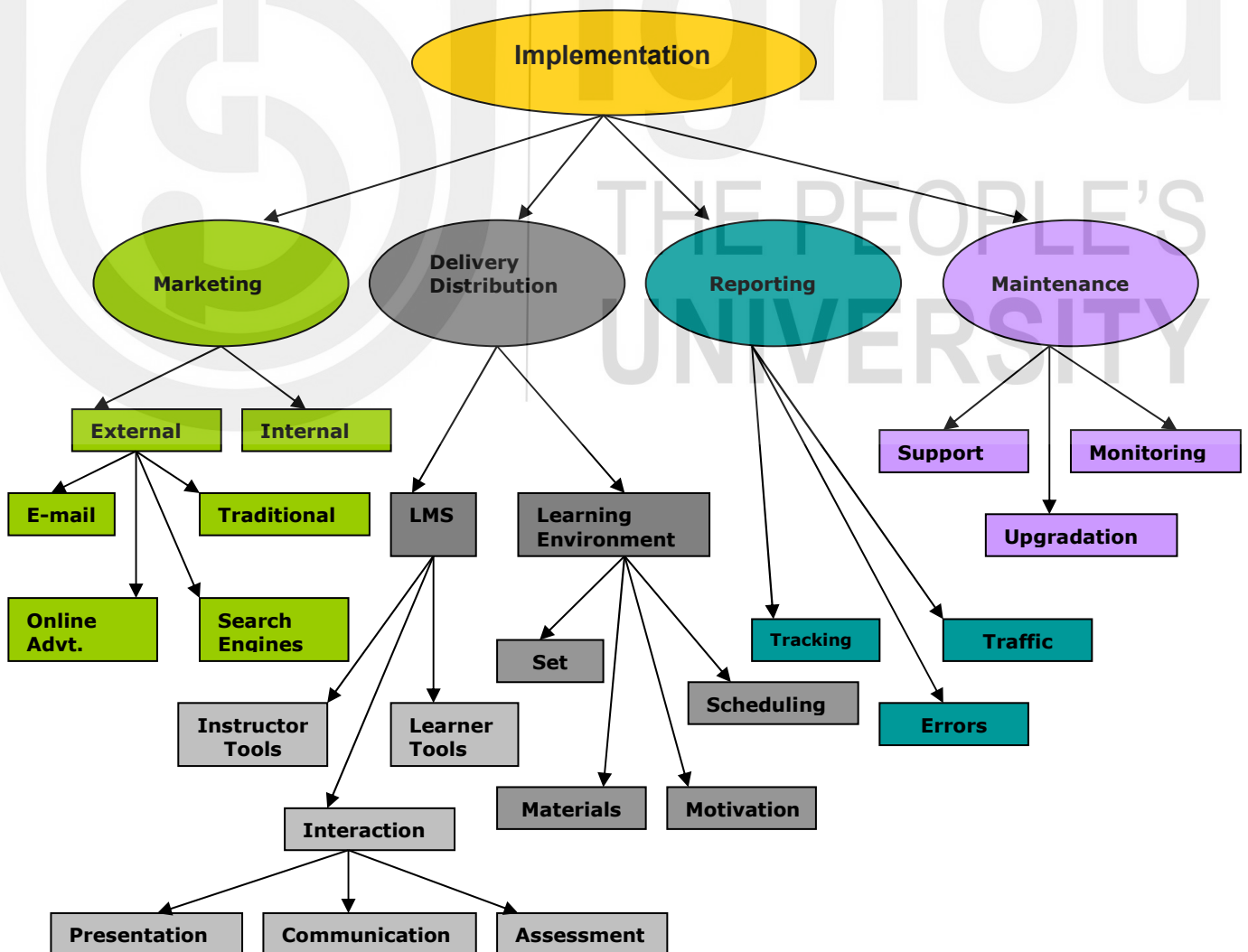
.....

.....

.....

.....

The **concept map** below illustrates various aspects of implementation.



20.5.5 Evaluation

Evaluation is important to ensure that the course meets the objectives that we have formulated. Evaluation will also help in the revision and improvement of the course in the future. It is essential to design formative and summative evaluation methods that are congruent with the instructional activities as this will support achievement of the stated learning goals. Continuous assessments provide feedback that the instructor or the designer can use to correct design problems as the course progresses. Without appropriate evaluation it is almost impossible to bring about the improvement essential for the success of the programme. In Block 03, Unit 15, Course MDE-412 this concept has been discussed in detail.

20.6 RAPID INSTRUCTIONAL DESIGN AND RAPID E-LEARNING

The traditional e-Learning instructional design enable iterative steps for development of course/programme (analyze, design, develop, evaluate, get feedback, revise, and then implement). These courses/programme have the need for urgent development and often have a short shelf-life. Often these programs have smaller budgets, smaller teams, and require intimate involvement of subject-matter experts. The instructional design suitable for such situation is known as rapid instructional design and rapid e-Learning. De Vries and Bersin (2004) identified the following criteria for defining rapid e-Learning. They are:

- Courseware which can be developed in less than three weeks;
- Subject Matter Experts (SMEs) act as the primary resource for development;
- A well-known tool (e.g., PowerPoint) or user friendly templates form the starting point for courseware;
- Simple assessment, feedback and tracking provided;
- Media elements which enhance learning but do not create technology barriers may be included (e.g., voice);
- Synchronous (live) and asynchronous (self-paced) models may be utilized.
- Rapid e-Learning is often developed in response to urgent business needs, such as:
 - a product launch or competitive situation;
 - as part of a continuous update program;
 - when the content has a short shelf-life.

Therefore, rapid e-Learning is designed when the content of a programme requires changes or have to be updated frequently and also when there is a need for quick delivery of a programme with reusable learning objects.

Check Your Progress 4

Notes: a) Write your answer in the space given below.

b) Match your answer with the answer given at the end of this Unit.

Discuss the criteria for defining rapid e-learning.

.....

.....

.....

.....

20.7 LET US SUM UP

E-learning is referred to as the use of networked information and communications technology in teaching and learning. As the letter 'e' in e-Learning stands for the word electronic, this incorporates all educational activities that are carried out by individuals or groups working online or offline and synchronously or asynchronously via networked or standalone computers and other electronic devices. In this Unit, we have discussed designing e-Learning and contributions of instructional design models. E-learning affords opportunities to design learning environments that are authentic, situated in the learning context, and also problem-based. These aspects are useful for providing students with 'learning by doing' experiences.

20.8 CHECK YOUR PROGRESS: POSSIBLE ANSWERS

Check Your Progress 1

The features of e-Learning are self-paced, self-directed, anytime-anywhere learning, faster learning, less-expensive and collaborative learning. (Please see Section 20.3)

Check Your Progress 2

The elements involved in designing e-Learning are defining instructional objectives, developing instructional content, method, media, instructional delivery system and evaluation. (Please see Section 20.4 and Table 20.1)

Check Your Progress 3

1. An Analysis phase of e-Learning consists of needs analysis, learner analysis, content analysis and technical analysis (Please see Sub-section 20.5.1)
2. Please see Sub-section 20.5.4.

Check Your Progress 4

The criteria for defining rapid e-Learning are: Courseware design, selection of SME, feedback, synchronous and asynchronous models (Please see section 20.6).