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## **UNIT 2    BASICS OF COURSEWARE DESIGNING**

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### **Structure**

- 2.1 Introduction
- 2.2 Objectives
- 2.3 Selection of learning Experiences
  - 2.3.1 Need survey
- 2.4 Instructional Goals and Objectives
- 2.5 Selecting Media
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- 2.7 Content Development
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### **2.1 INTRODUCTION**

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Unit 1 develops the concept of instructional design (ID) and mentions the steps involved in developing an ID. This unit deepens your understanding of ID by describing ‘how’ to take these steps, and thus prepares you for designing instructions for courseware. As you read this unit you will find that the processes involved in instructional designing are not isolated but are interrelated and determine each other. Hence, you will see that the rationale for offering courseware established through need survey, determines goals and objectives, which in turn determine selection, and organisation of content. Evaluation of the courseware assesses the adequacy of these processes in the light of the instructional objectives. Thus this unit will help you in taking a holistic approach towards courseware development.

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### **2.2 OBJECTIVES**

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This unit will help you to:

- Carry out a need survey;
- Develop instructional goals and objectives;
- Select appropriate media for delivering courseware;
- Organise content selected for courseware; and
- Evaluate courseware.

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### **2.3 SELECTION OF LEARNING EXPERIENCES**

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Courseware is developed for teaching a course and includes content that provides necessary learning experiences. What is the basis for selection of learning experiences

for a courseware? Learners' needs provides the basis. Need survey helps to determine the needs.

### 2.3.1 Need Survey

What is need analysis? Need analysis is also known as 'need survey' or 'need assessment'. This requires us to determine what learners want to learn. Do schools ask children what they want to learn? Adult learners unlike children are more likely to be sure of their learning needs. In such cases the need is explicit (clearly stated), and is a major factor that determines what is to be taught. Courses for teaching children with special needs, music, repairing electrical gadgets, programming and the like are offered in response to such explicit needs. However courseware can be offered even when learners do not explicitly demand it. For example an organization may perceive skill deficiency in a particular area and feel that its employees can perform better with training. New developments in a discipline can also lead to courseware development. Social changes also trigger new areas of studies and hence courses, for example on gender equality, child rights and so on. Thus, courseware development is a response to needs for learning. However, need survey is carried out for ascertaining learning needs expressed by learners.

#### How will you carry out need survey?

The group of learners likely to use the courseware comprises the target group (also known as target audience). During need survey you determine 'what' their learning needs are, and proceed towards the determination of 'who' they are. Answer to the first question helps to establish the learning experiences to be provided. Once we have identified the target group and have an understanding of the area of course development, we may carry out a pretest to assess the entry level knowledge of the target group (see unit 1-Dick and Carey Model). For example you may assess your trainee's level of communication skills before you develop a training package for developing communication skills.

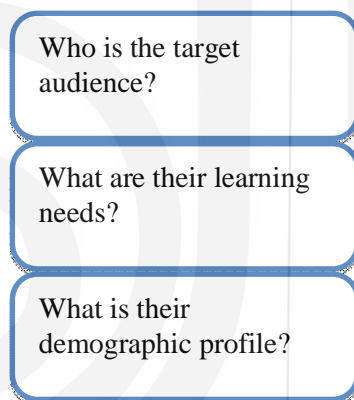
The second question helps to develop the *demographic profile* of learners. Demographic information comprises information about age, place where learners stay, gender, access to technology, whether they are in-service, and the like. Why is demographic information collected? Age is an indicator of the maturity level and hence readiness for learning (see unit 1). Moreover adult learners usually have social responsibilities. As prior learning is important for new learning, information about academic qualification and experience in the concerned field is important. Having in-service people as learners implies that they may be experienced but may not have access to programmes broadcast during their working hours. Further they may not be able to devote much time to the course. Hence, many course providers mention the time (number of hours in a week) learners needs to devote to the course. Learners' access to learning opportunities, especially when content is delivered through technology is also important. For example rural learners especially women could have much lesser access to technology than male learners. Information about access to technology therefore helps to plan the delivery of instructions.

Demographic information collected through need survey also projects the cultural practices of the target group. Hence while designing illustrations we portray people wearing local dresses; include examples of locally available nutritious food in a programme on nutrition; consider the language preference of the learners of the locality. Thus demographic information guides the development and delivery of the content.

## Data collection

If the population of the target group is large it may not be feasible to contact every learner. In such cases data is collected from a sample. A sample should ideally be representative of the population and proper sampling methods (you may read about this from a book on research methodology) should be followed. If the number of learners is not very high data can be collected from all those who wish to enroll in the course.

**Tools for data collection** are usually questionnaires (include a series of items usually expressed as questions for gathering information) &/interviews. Questionnaires are useful when the population is large and scattered. Interview is suitable for small and localized target groups. The data collected is usually qualitative (not in numerical form but descriptive) and has to be analyzed for determining the trends in the data. For example the trends emerging from the data may be -learners need to update their knowledge of macroeconomics; they want the courseware in Hindi medium; they are in-service teachers; their average age is 35; they have limited access to Internet. The trends emerging from data help us to construct learner profile (read case 1). Need survey (Figure1) thus helps instructors to make informed choices about learning inputs and the way to provide such inputs (Commonwealth of Learning, 2005).



**Figure 1: Need survey**

### Case 1

The data collected through open ended interviews during a need survey revealed that -the target group needs to learn about the techniques of providing first aid. The demographic information showed that most learners have not studied beyond primary level; they stay in a forest area far from the town where the study center of the institution is situated; their age ranges from 12 to 60; about 50% of them are women; they understand mainly the local dialect. They cannot use computers and most of them are not willing to visit study centers for availing the support services as a visit to study center would lead to loss of a day's earning.

How will you develop courseware for the target group?

One way could be to create large number of pictures. The pictures can show which type of first aid is required in which case. Series of images depicting the steps of first aid to be provided for injuries caused by burning, falling, insect bite, snake bite, and the like need to be created. For snake bites, even the type of snakes that are non-poisonous and poisonous can be shown pictorially. Text should be less, in large font and supported by images. CDs with audio supporting the print and interactive radio programmes can be used extensively for delivering instructions.

The target group may be concentrated within one organisation. For example the Kendriya Vidyalaya Sangathan as well as the Navodaya Vidyalaya Sangathan had approached IGNOU for providing in-service education to its teachers. The government of several states of India also approached IGNOU for training the elementary level teachers of the state. In such cases identifying the target group was easy and determining its needs was not difficult (case 2). These processes are relatively difficult when the target group is scattered over a wide geographical area.

### Case 2

IGNOU offered the Certificate Programme for Professional Development of Primary teachers in 2014. The target group of the programme comprised teachers teaching at the primary level of Kendriya Vidyalayas (KV). Before developing the programmes there were discussions with a sample representing the target group. The sample was interviewed for determining their learning needs. Demographic information was however not collected as information about their academic background, nature of employment, and the like were known.

The data collected revealed that they required inputs for understanding certain theoretical concepts of teacher education; ways for making classrooms inclusive; developing competencies for implementing the pedagogies required by the Right to Education (2009), and so on. These needs guided courseware development and learning experiences (content) were selected accordingly.

Learners are often spread across geographical areas. In such cases it is not easy to determine needs (Case 3).

### Case 3

Before developing IGNOU's Post Graduate Diploma in Educational Technology (PGDET) programme (revised) we have carried out a study for determining learners' needs. IGNOU's learners are spread across India and predicting who would enroll was not possible. Therefore, it was planned to contact the learners who had enrolled earlier. Academic counsellors of IGNOU's Educational Technology courses were also contacted (Academic counsellors are teachers of conventional teacher education colleges and university departments and carry out tutoring and counselling for IGNOU's learners at IGNOU's study centres usually on weekends).

Questionnaires were mailed to a large sample of learners who had enrolled earlier and academic counselors, to know their opinion about the relevance of the course content. The rate of response was however low. The curriculum of Educational Technology of Indian universities as well as well-known institutions abroad was examined to determine what was being taught. We also studied various documents on Educational Technology including policies, and research papers. We then held meetings with Educational Technology experts. Thus needs of the discipline as well learners' needs in this field were determined. We set the goals for the programme accordingly and selected the themes to be taught through the theory courses. Thereafter we developed the courseware.

MOOCs (short online courses) are developed by many institutions on various themes and a learner selects a course s/he will study. In such cases the perception of need for courseware in a particular area leads to its development. Thus identifying the target group and determining their need is a challenge. Nevertheless, need survey leads to a robust ID and enhances the relevance of the instructions.

**Activity**

Marya’s store sells electronic goods. It has employees for housekeeping, maintaining accounts, describing the products to customers, packaging, and delivering goods. She wants to train those describing the products to customers so that they are able to provide effective and convincing descriptions of products. Which tool should Marya use for identifying the needs of the target group? Develop a tool for Marya.

**Sample tool for need survey**

Dear Respondent,

We are planning to develop an academic programme in the area of Educational Technology. We request you to spare some time and fill up this questionnaire. The information you provide will be treated as confidential. Please answer all the questions as your responses are valuable for this study. You may mail us your response by ..... at ...

**Section 1- Demographic details**

Name (optional):

Postal Address:

**Please put tick mark on one/more options**

Gender: Male/female/Other

Age group: Below 30/ 31-40/41-50/ 51 & above

Educational Qualification: Graduate/Post Graduate/Higher qualification

Whether In-service: Yes/no

You have access to : Computer/Internet

You can use: Computer/Internet

You can visit study center: once in a week/once in a month/ cannot visit

You can devote the number of hours per week for the programme: 4/6/8/ more

You prefer to learn through: Print/audio/video/ a combination of these

You prefer course duration of- 6 months/1 year/2 years

The medium you prefer is: English/Hindi/other

**Section 2- Please use the space given below to answer the following questions :**

1. Have you studied a course on Educational Technology earlier? If yes mention the name and the institution offering it.

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.....  
.....

2. Why do you want to study Educational Technology?  
.....  
.....  
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3. What would you exactly like to learn in the field of Educational Technology?  
.....  
.....  
.....

4. Do you have any specific expectations from the programme? If yes, please mention.  
.....  
.....  
.....

### 2.4 INSTRUCTIONAL GOALS AND OBJECTIVES

After need analysis we can set instructional goals. You have read that instructional goals are the basis of instructional designing and guide courseware development. Instructional goals also keep instructions and learning focused, and are standards for assessing learning outcomes.

Goals and objectives are often used interchangeably but we have used goals to imply broader and generic statements regarding learning outcomes from which, more specific objectives are drawn out to indicate what learners will exactly do (see unit 1). According to the Commonwealth of Learning (2005):

**Objectives help teachers to:**

- Clarify educational intentions to learners;
- Provide suitable educational experiences through selection and organization of appropriate instructional inputs;
- Decide most appropriate media for imparting instructions ;
- Develop appropriate instructional strategy in terms of media, techniques, activities, content load, assessment plans, etc.;
- Assess learning (output), instructional inputs, and the instructional process.
- Keep teaching and learning focused;
- Carry out programme evaluation and revision.

**Objectives help learners to:**

- Know what would be covered in the unit and what is expected from them;
- Keep learning focused;
- Prepare for the challenges ahead and standards to be attained;

- Carry out self evaluation;
- Prepare for assessment;

### Objectives help managers to:

- Build accountability by assessing whether teachers have designed instructions effectively;
- Assess whether adequate resources and support are there for the courseware.

#### Activity

Reflect on the functions of objectives discussed in 2.4 and assess the appropriateness of the objectives of this unit.

### How to state goals and objectives?

Let us examine the following example:

The instructional goals of the PG Diploma in Educational Technology programme of IGNOU are to help learners to:

- comprehend the concept of educational technology and the contexts of its use;
- judiciously select and use technology for pedagogic and managerial functions;
- develop skills for using technologies for individual and collaborative educational practices;
- use technology for creating an inclusive learning environment;
- integrate technology effectively in pedagogic processes in contextually appropriate ways; and
- design and develop digital resources for various media and utilise them for creating a courseware.

We find that the goals state what the learners are expected to do after instructions, i.e. after using the courseware. Goals therefore guide the selection of themes and sub themes. For PGDET each theme led to a course and each sub theme led to a block. For instance, the first course 'Educational Technology: An Overview' has been conceptualized on the basis of the theme emerging from the 1<sup>st</sup> and 2<sup>nd</sup> goals. The 3<sup>rd</sup> and 4<sup>th</sup> goals led to the 2<sup>nd</sup> course; the 2<sup>nd</sup> and the 4<sup>th</sup> goals led to the 3<sup>rd</sup> course; and the last goal led to this course.

Instructional goals provide directions and hence, you **need to state these clearly and specifically**. "The goal, or goals, are most inadequately conveyed by the term citizenship; they are better reflected in a statement such as "carries out the activities of a citizen in a democratic society" (Gagne, Briggs & Wager, 1992, 41). We have therefore not stated that the goal is 'teaching educational technology'. Why? This is because this does not clarify what exactly would be taught. Further goals need to reflect learning outcomes as well as the means of attaining the outcomes. Hence, a goal is not stated as 'health' but as 'learners will perform activities that will maintain health' (Gagne, Briggs & Wager, 1992).

To know more about this topic visit [https://en.wikiversity.org/wiki/Instructional design/Learning objectives](https://en.wikiversity.org/wiki/Instructional_design/Learning_objectives)

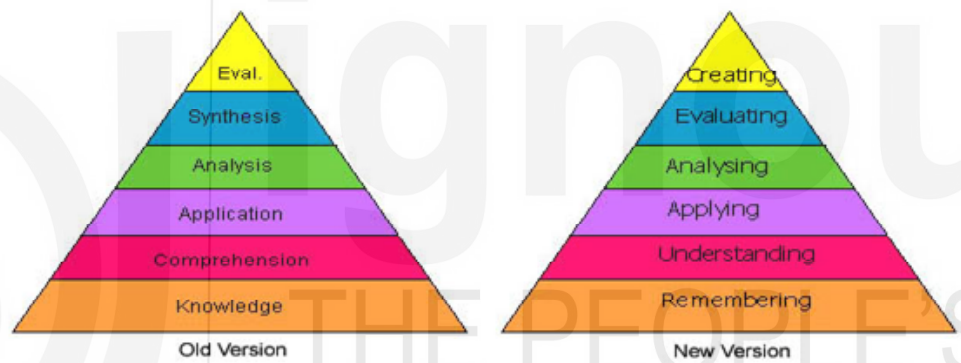
### How to state instructional objectives?

Goals are broader in scope and objectives can be derived from them. Read the objectives of this unit. You will find that we set objectives –

- the attainment of which can be assessed.
- that are achievable (realistic, in keeping with the learner profile).
- that are stated as short and simple sentences. A complicated objective comprising several sentences could be confusing.
- that are few instead of too many objectives.
- That begin with ‘action verbs’ to indicate the action (like describe, explain, calculate, develop, build, analyse and so on) that learners can perform after the instructions.

### How to decide the difficulty level of content?

Learning has three domains (cognitive, psychomotor and affective) (see unit 1). Each of these domains allows different levels of learning beginning with simpler levels to higher ones. In 1956 Benjamin Bloom, an educational psychologist proposed a taxonomy of learning for the cognitive domain (Figure 2).



Source: Wikipedia -[http://www.odu.edu/educ/llschult/blooms\\_taxonomy.htm](http://www.odu.edu/educ/llschult/blooms_taxonomy.htm)

Figure 2: Bloom's Taxonomy and its revised version

Anderson & Krathwohl (2001) revised Bloom's taxonomy (Figure 2). They named the lowest level as remembering. Comprehension and synthesis were made understanding and evaluation respectively, and creating was placed at the highest level.

The levels beginning from simple acts of cognition like just knowing, reach higher levels of cognition like evaluation. Read the following example to understand this:

We **know** the months when monsoon usually arrives in India; **understand** the reasons for the timing; **apply** our understanding to explain the arrival of monsoon in a particular part of India; **analyse** annual data for rainfall of an area; **synthesize** findings of different years to generalise the rainfall pattern of an area; and **evaluate** the suitability of a particular type of architecture of houses/crop vis a vis the rainfall pattern of the area. Therefore, to evaluate something we must know and understand it, be able to compare it with other similar things, take an analytic view, draw conclusions (synthesize) and thus be in a position to evaluate it.

#### Activity

For which type of learners will you set objectives pertaining to the lower levels- those, having greater or lesser readiness for learning? Why?



Now you can understand that objectives of instructions can pertain to lower/higher levels of cognition. For lower levels providing information suffices but for higher levels, suitable activities, exercises and other devices is required.

**How will you ensure that a learner has actually learnt?** To ensure this we state objectives with ‘action verb’. For example- after studying this unit learners will be able to ‘describe’/ ‘explain’ . . . . Describe/ explain and the like are actions that learners should be able to perform following the study of the courseware. The use of such action verbs makes learning assessable and we can assess whether the instructional objectives are attained. The following examples (Table 1) will help you to understand how action verbs for different levels of cognition are used for stating objectives.

**Table 1: Use of action verbs for different levels of cognition for stating objectives**

Level of cognition	Examples of Action Verbs	Example of objective
Knowledge-know	Choose, define, find, label, list, match, name, recall, relate, select, spell, tell	Learners will be able to state the major functions of kidneys
Understanding/comprehension	Organize, compare, translate, interpret, describe, distinguish	Learners will be able to compare behaviourism with constructivism.
Application- apply knowledge, facts, techniques and rules	Apply, develop, experiment with, identify, make use of, model, organize, plan, solve, calculate, modify, demonstrate	Learners will be able to calculate simple interest using the formula for it.
Analysis-break down information into its constituent parts	Analyze, categorize, classify, compare, contrast, discover, distinguish, divide, examine, inspect, simplify, test for; arrange, organise, infer	Learners will be able to analyze the information for population growth and predict the population of an area for 2025.
Synthesis-compile information	Develop, prepare, build, combine, compile, compose, construct, create, design, develop, elaborate, estimate, formulate, propose	Learners will be able to develop an instructional design on the basis of the information about its components
Evaluation-make judgments	Evaluate, assess, judge, choose, criticize, decide, deduct, defend, determine, estimate, judge, justify, mark, rate, rank, grade, recommend, rule on, perceive, prioritize, select, etc.	Learners will be able to evaluate the authenticity of information received through social media

Cognitive domain is usually used for instructional designs. We shall not discuss in detail the psychomotor and affective domains but only mention the levels of learning within these domains. You can read about these domains using sources like [https://en.wikiversity.org/wiki/Instructional\\_design/Psychomotor\\_behaviors/Introduction#What is a Domain?](https://en.wikiversity.org/wiki/Instructional_design/Psychomotor_behaviors/Introduction#What_is_a_Domain?)

### Psychomotor Domain

Psychomotor Domain is the skill based domain. It consists of the following five levels.

**Imitation:** Observing and patterning behavior after observing someone/ something, like - imitating the steps for changing car tyre.

**Manipulation:** Learner performs certain actions on his/her own after learning by imitating, like repairing brake on his/her own.

**Precision:** Refining for attaining exactness like fixing brake with precision.

**Articulation:** Complex overt response that expresses learners' views like a learner articulates 'I still cannot handle the tool as well as my instructor'.

**Naturalization:** high level performance that becomes natural, like effortlessly repairing a machine.

### Affective domain

The five major categories of behaviour within the affective domain are as follows:

- **Receiving Phenomena:** Awareness, willingness to hear, for instance a lecture on giving up addiction to gaming.
- **Responding to Phenomena:** Active participation by learners, for instance during a discussion on consequences of excessive gaming.
- **Valuing:** Internalisation of values and their demonstration, for instance not indulging in gaming.
- **Organisation:** Organises values into priorities by comparing and contrasting values, and creating a value system. For example, valuing playing outdoor sports and games rather than gaming.
- **Internalising values (characterisation):** Learner develops a value system that controls his/her behaviour. Such behaviour is pervasive and consistent and characterises the learner who may always try to resist the tendency for engaging in online gaming.

#### Activity

Read the instructional goals of the courses of this programme and examine the instructional objectives listed in the units of these courses in the light of these goals.

Formulate instructional objectives for a topic you would like to teach.

#### Check Your Progress 1

Select the appropriate option(s) for each of the following:

1. Need survey for teaching script writing needs to determine:
  - a. Learners' knowledge of essentials of script writing
  - b. Learners' ability to communicate in English
  - c. Learners' experience of script writing
2. An appropriate instructional goal is:
  - a. Learners will describe educational technology
  - b. Learners will describe the concept of educational technology
  - c. Learners will describe the benefits of using technology in education

3. A goal is:
  - a. Broader in scope than an objective
  - b. More specific than an objective

## 2.5 SELECTION OF MEDIA

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The medium/media for delivering instructions has to be selected judiciously. Judicious selection means taking care that the target group has access to the technology, can operate it, and the medium is suitable for the content to be taught. The 3<sup>rd</sup> and 5<sup>th</sup> units of the third course “Selection and Integration of Technology in Educational Processes” describe these aspects.

As per Gagne (1983), as cited in Gagne, Briggs & Wager, (1992) instructional media are the physical means by which an instructional message is communicated and hence, print, audio, television, along with many other physical means, are all considered media. The World Wide Web is also a medium. However media and technology are not the same and along with selection of media, technology selection is also important. For example radio and audio CD are technologies but the medium is audio. Learner may have access to radio but not to a CD player. Similarly a television programme and a DVD are different technologies presenting content in video medium. Text is used for print medium as well as for the web medium but not all learners can access and use web based content. Bates (1995) listed factors that guide selection of technology and used the acronym ACTIONS for representing a model for technology selection.

A- ‘Access’ - The target group should have access to media/technology that is selected/ deployed. Access to technology is determined by a number of factors. Geography, gender, socio economic status and other such factors determine access, and at times in a complex way. For instance, men from socio economically weaker sections may have more access to advanced technology than many women learners of well to do families with male members being the main users of computers and advanced phone. Study centers of IGNOU therefore provide access to IGNOU’s audio and video programmes and also to teleconferencing sessions. However, as learners’ access to technology is important, hence even though print restricts interactions between learner and the instructor, it is the main instructional medium of many distance education intuitions of India.

C-cost involved is crucial. For example broadcast involves expenses that the organization must be able to afford, using student fees or government grants/other means.

T-Teaching and learning should be supported by the media selected.

I- is the degree of interactivity. For example live radio/television programmes and some online courses allow learners to interact with instructors and peers. Ease of use is enhanced by user friendly technologies and this enhances interactivity.

‘O’ stands for the organization. An organization’s human, technological and financial resources as well as willingness and ability to use technology are important factors. An organization having a studio; skilled employees who can operate the technologies; and financial means is in a better position to select audio and video media.

N-novelty factor in the technology used can draw learners’ attention. For example new versions of phones, tablets attract people.

S- Stands for speed and how quickly courses can be mounted and changed are important. For example unlike the content of a video programme, text uploaded for a web based course could be easier to change and update.

The SECTIONS model of technology selection (Bates & Poole, 2003) is based on the ACTIONS model but has some differences. S stands for students and appropriateness of technology is judged on the basis of the target group's age, access, ability to use and so on. E is ease of use and reliability, i.e. how easy it is for both teachers and students to use the technology and how reliable and well tested the technology is. Rest of the factors is the same as that for the ACTIONS model.

The **Technological Pedagogical Content Knowledge (TPACK) model** (Koehler, & Mishra (2005); Mishra & Koehler (2003; 2006) (Course 3 describes this model) is based on the relation among three domains- content, pedagogy (method of teaching) and technology. This model recognizes the 'strengths' and 'weaknesses' of each medium. For example you can select print for elaborate deliberations and narratives but you cannot show processes, demonstrations, situations and so on like you can do using a video; a video is therefore suitable for teaching how to carry out a surgery. You can select audio for descriptions, dramatised narrations, commentaries and so on but not for detailed narratives. Different aspects of a topic can also be taught by using many media. For example print medium can be used to describe instructional designs, videos can explain various models of ID; and audio can explain the genesis of IDs.

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## 2.6 SEQUENCING CONTENT: CONTENT AND TASK ANALYSIS

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Once we have set the goals and objectives we get an idea of 'what' learners should be able to 'do'. For attaining objectives and goals we need to **select content** for enabling learners to perform the task, which they are expected to carry out. You will read in the next few units, especially in unit 5 how content is selected. Therefore, we shall not discuss it in this unit. The content however needs to be selected with care so that it provides the required learning experience. For example the content of this unit provides you with learning experiences pertaining to instructional designing.

The content selected has to be **organised**. Organisation of the content is deciding what to teach first how to end the lesson and what should be there in between. This requires that the content is sequenced.

### How do we sequence the content?

Sequencing means placing the content in a certain order and deciding what to teach first and what to teach after that. The ordering is planned in view of what could be learnt first so that subsequent learning is easy. Actually the sequencing is visualised at the stage of setting instructional goals. Instructional goals therefore reflect the sequencing of the content. As a principle, simple and basic things are taught first and then their specificities, i.e. details are taught. Details add to the complexity of a theme. For example we teach about plants then about its parts, then the structure and function of the parts and, after that we teach these at the cellular level during advanced level courses. It is like learning simpler tasks like writing alphabets, then words and then sentences that are more complex than alphabets and words.

Techniques like content analysis and task analysis help to sequence and thus organize the content we have selected for the courseware.

### Content analysis

You have read (unit 1) that new learning is attached to schema (cognitive structures). The content to be taught also has a structure of its own and we need to visualize it. For instance while teaching about the earth we visualise its structure as an outer solid layer (crust), its mantle, and core. We can begin with the crust as learners are already aware of it and see it every day. Hence we may first teach about the earth as a planet, its crust and then teach details like the inner layers of earth. Content analysis thus places general ideas first and specific things later around it. For example, the previous unit provided a general understanding about ID, while this unit teaches its steps and hence the specifics (details). The specifics are thus organised around an axis, which is the ID. By learning specifics learners gain advanced knowledge and make progression in learning.

#### Activity

Reflect on the structure of a content that you would like to teach and sequence the content for teaching.

### Concept map

Content analysis can lead to a concept map for the content to be taught. A concept map structures not only the content but also presents the structural linkage among the constituent parts. This helps us to organize and sequence the content. Figures 3 and 4 present examples of concept map.

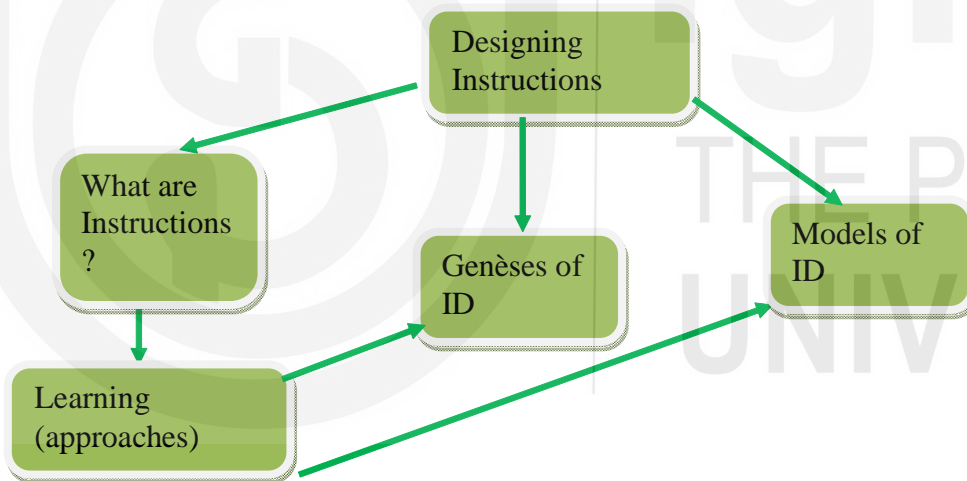


Figure 3: An example of concept map

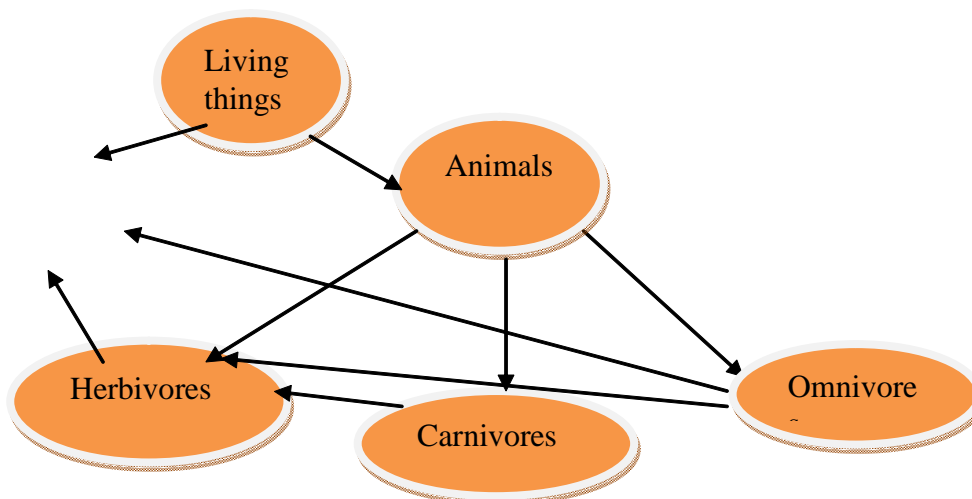
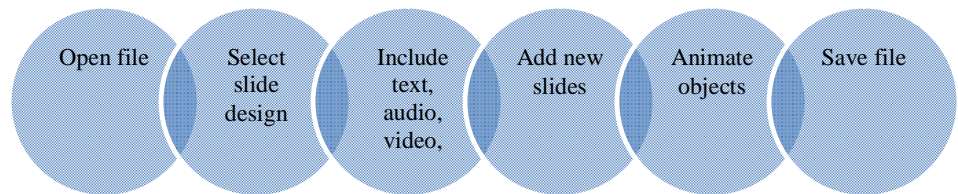


Fig.4- Example of concept map

### Task analysis

Task analysis is also an approach to sequencing learning. Learning in this case is supposed to be manifested as tasks. Task analysis helps to plan what learners should **do** first and what they should do subsequently. Tasks are hence, sequenced. Complex activities can be visualized as a chain of tasks like writing a script, preparing a story board, recording a video programme, evaluating it and so on. See the example (Figure 5) to understand how content is organized in terms of the tasks to be performed by learners. This approach is especially useful while teaching skills. Learners learn in a stepwise manner till they are capable of complex activities requiring multiple skills.



**Figure 5: Example of task analysis: Steps (individual tasks) for developing slides**

To know more about task analysis visit:

<https://www.usabilitybok.org/task-analysis>

[https://en.wikiversity.org/wiki/The\\_Task\\_Analysis](https://en.wikiversity.org/wiki/The_Task_Analysis)

#### Activity

Develop a concept map for a topic, which you would like to teach. The maps should show the relation among the constituent parts of the concept.

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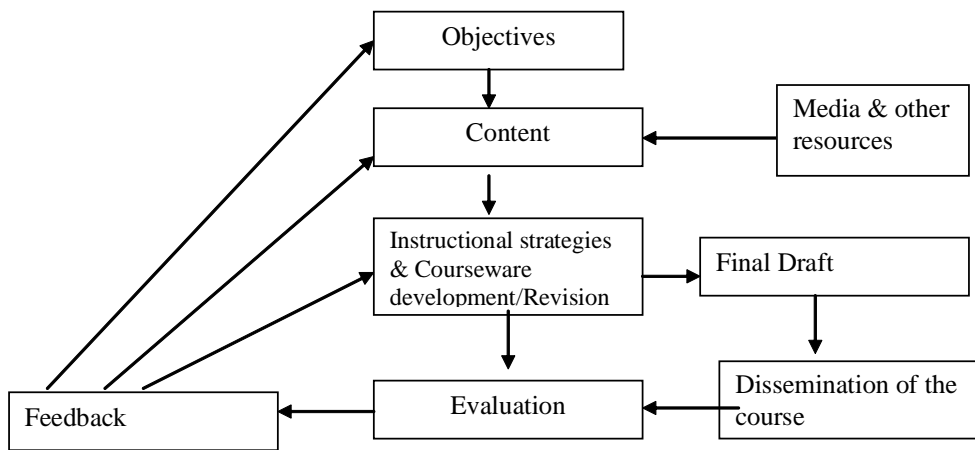
## 2.7 CONTENT DEVELOPMENT

After setting instructional goals and objectives and sequencing the content we have to present learning experiences in a way that facilitates learning. The content has to be authentic and it should have pedagogic elements that teach. We can either develop the content or if it is already available and is an open/free resource, we can use it. Unit 3 describes how content for print or web that requires textual information is to be developed. Units 4 and 5 are for content development for audio and video media respectively. Unit 6 is about content development for multimedia and, use of resources already available. Hence, we shall not discuss this in detail in this unit.

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## 2.8 EVALUATION OF INSTRUCTIONS

While developing courseware we need to assess whether the courseware will lead to the attainment of the objectives, and after the delivery of the courseware we need to evaluate whether learners can carry out the tasks as envisioned by the objectives. For instance after studying this course you must be able to carry out the activities that are listed as its objectives. Instructional goals are attained when learners are capable of performing the learning tasks. In case of a mismatch between learners' performance and instructional goals what should we examine? All the components of the ID right from need survey (Figure 6). It is possible that needs might not have been surveyed well. Moreover needs change. For example a courseware teaching about computer programmes used in the past are no longer required by new learners. In such cases when learning needs change, the other components of the ID lose their relevance.



**Figure 6: Evaluation strategy (Source: Dharam Prakash, 2008)**

### Stages at which evaluation is carried out

Evaluation helps to take a re-look at the components of the ID and re-plan instructions. This can be done while developing the courseware. This type of evaluation, carried out at the formation stage, is known as **formative evaluation**. For example the units you are reading have been evaluated by experts before these were finalized. Audio and video programmes (rough cuts) should also be previewed by experts and, preferably even by a sample of learners for whom the programme is being developed. The feedback obtained thus helps to revise and improve the instructions. Evaluation after delivering instructions is known as **summative evaluation**. Formative evaluation requires data collection with the help of tools like questionnaires and interviews from subject matter experts, teachers, peers and even learners.

Some of the reasons for formative evaluation are (Kutiala, 2008):

- identifying the problems in the early stages of courseware development;
- improving the planning, management and implementation of a courseware;
- fine-tuning the implementation of the course;
- improving the impact or effect of the courseware;
- making summative evaluation more meaningful;

### How to carry out formative evaluation?

Formative evaluation requires data collection, and data (feedback) should pertain to:

**Subject matter (content):** Experts and teachers can assess its authenticity and also its suitability for the target group.

**Pedagogic effectiveness of the courseware:** capacity to teach and develop the capacity for performance as per instructional goals

**Other attributes of the courseware:** There are various attributes of a courseware apart from its content and pedagogy. The visual treatment (see unit 5), aesthetics, appropriateness of the format, and the like can be assessed for a video or web based visual content. For example, a pilot (experimental) version of multimedia self-learning package on Atomic Structure and Periodic Table was created and the developers wanted to know learners' reactions on screen design, placement of function buttons, explanation of experiments, their appropriateness, and the like. A sample of

students used the CD with the content and responded through a questionnaire about the aspects examined. The analysis and interpretation of data obtained led to a total revamp of the design of multimedia, and many other features were added, which had not been thought of earlier (Dharam Prakash, 2008 ).

It is therefore important that the feedback is analysed and if the data is qualitative, content analysis can be carried out. Data can also be collected from the drop out sample i.e. those learners who quit the programme before completing it, administrators, and prospective employers.

Some questions that courseware developers should ask themselves are (Usha Rani, 2008):

- i. Questions related to the content
  - Is the difficulty level of the courseware in keeping with the level of readiness of learners?
  - Is the content load appropriate?
  - Is the language suitable for the target group?
  - Is the content appropriate for attaining the objectives?
  - Is the content factually correct and updated?
  - Is the content logically structured?
- ii. Questions related to teaching effectiveness of the courseware:
  - Is the courseware suitable for self-learning?
  - Is the sequencing of the content pedagogically appropriate?
  - Does the courseware meet the goals and objectives of the course?
  - Are the objectives of the course relevant to learners' need?
  - Are aims and objectives relevant to the needs of target population?
  - Are the aims and objectives stated explicitly?
  - Are the objectives supporting the goals?
  - Are there objectives which have been not been included but should be included?
  - Is the courseware interesting to the learners?
  - Are the concepts explained adequately?
  - Are the examples, analogies, case studies, illustrations, etc. used relevant and interesting to learners?

Similar questions can also be asked about the choice of media.

- iii. Questions pertaining to media
  - Do the media present the content appropriately?
  - Do learners have access to the technology?
  - Can learners access the courseware through the devices they use like tablets, phones, laptops etc.?



The feedback obtained can be organised under the following headings in the following way (Dharam Prakash, 2008):

- Concepts and sub-concepts
- Examples/analogies explaining the concept
- Sequencing and structuring of the content
- Difficult areas
- Redundant content
- Content to be added
- Pedagogic aspects
- Language
- Exercises and activities, etc.

The data under each head is analysed and interpreted and action points are listed for improving the courseware.

#### **Examples of formative evaluation (Source: Dharam Prakash, 2008))**

**Example 1:** While developing a video programme for enabling map reading, formative evaluation was carried out by testing the script with the target group. The feedback was about the ideas in the script and the problems in learning. After the formative testing, the script was rewritten.

**Example 2:** While developing a self-learning multimedia package in Chemistry, user's (teachers' and learners' opinion) was taken on the screen design and text presentation style. Based on the feedback that text should be structured along points and the pictures should be accompanied by explanatory text or commentary, the presentation strategy of the multimedia was revised. In this case, formative evaluation helped the courseware developers in fine-tuning their strategies.

The questionnaire for collecting feedback can include different types of questions, such as multiple-choice questions or open ended questions or a mix of both. A sample questionnaire/interview schedule (Dharam Prakash, 2008) is as follows:

##### Sample questionnaire items

- Was the subject matter of the courseware already familiar to you –all of it/ most of it/none of it
- How difficult did you find the courseware? Very difficult/ difficult/ appropriate/ easy
- Were there any sections/words/concepts, which you found difficult? Please mention these.

##### **Group discussion / interviews may include points like:**

- What did you like most about the unit/video/audio?
- What was it that you did not like:
- What was missing in it?
- Which portions/units did you find difficult to understand?
- What kind of additions/deletions/changes do you suggest in the content?

## Summative evaluation

Summative evaluation takes into account learners' achievement scores /grades; percentage of those completing the course; percentage of drop outs and other such information to judge the effectiveness of the courseware. It is carried out after the instructions have been delivered, i.e. the course has been taught. It can be in the form of achievement tests, used for grading and certification. It provides evidence of whether learners are capable of performing the learning tasks envisioned for accomplishing the objectives of the courseware. Higher pass out rates indicate effectiveness while low pass out rates as well as high rate of drop out question the effectiveness of a course. This type of evaluation however considers not only learners' performance but also other factors like employability, admission to advanced courses and the like. Even if learners' performance meets the requirements of instructional goals but they fail to get employment, re-assessment of its instructional inputs is required. If dropout rate is high the programme could be placing demands that learners are unable to fulfill.

An example of summative evaluation (Source: Dharam Prakash, 2008): A series of video programmes were produced. The production team wanted to know how the series would communicate the intended message to the learners. A questionnaire was designed and a semi- structured interview schedule was planned for summative evaluation. The feedback was used to revise and update the video programmes.

Summative evaluation thus sums up the impact and educational effectiveness of the courseware and gives inputs which can be utilized not only for improving the particular courseware but also for guiding the development of similar such courseware.

**Long Term Impact Studies** (Source: Dharam Prakash, 2008) As the impact of a course cannot and will not happen within a short span of time, long term impact studies are undertaken generally to understand the impact of the courseware on learners. Long-term studies however require lots of planning, resources, monitoring, rigorous evaluation methods, and the like. The long term impact study on SITE (Satellite Instructional Television Experiment, 1975-76) of India gave positive feedback and Satellite-based telecast has been used for the telecast of educational television programmes through INSAT series of satellites.

To find out the impact of any courseware rigorous experimental impact studies are also carried out. In such studies, the impact of the courseware is measured experimentally through -

- Pretest and post test design in which the learners are tested for specific abilities before they undergo the course and again after they complete the course.
- Post test only, where the learners are tested for specific abilities after the input of the courseware has been given.

Such experimental impact studies indicate the impact of the courseware on learners. For example, for testing a series of video programmes for teaching Mathematics for class XII, an experimental study with pretest – post test design was used. Tools for pretest and post-test were developed and pilot tested. The randomly selected experimental group was given the pretest for assessing the development of specific abilities that the video programmes were supposed to develop. For three days the series of video programmes was shown to the experimental group. This was followed by a post test. The data was analyzed and the impact study revealed that the video programmes made a significant impact on learning. The students also made certain suggestions for improving the video programmes.

## Project Talent

Longitudinal or follow up studies are undertaken to determine whether the desired outcomes of a programme are being attained. A well known longitudinal study carried out through survey on high school students at the national level in the USA is the Project Talent. Although it was initiated in 1960, nevertheless, it is still famous for its scale and comprehensiveness. The rationale of the study was to determine the effectiveness of schools and its impact on the lives of students.

The study was designed by the American Institute for Research and led by John C. Flanagan. It involved 1,353 public, private, and other types of schools. Extensive data were obtained from a sample of 4,40,000 high school students across USA.

In 1960 competencies of the participants of the study, studying in grades 9 through 12 were tested for subjects like mathematics, science and reading ability was tested. Data about the participants' family background, personal and educational experiences, educational and vocational aspirations and interests in occupations and activities was also collected. Follow-up surveys were conducted one year, five years, and eleven years after their high school education for collecting data about educational and occupational attainments, marriage, family and other aspects. The data collected informed 450 government reports, scholarly articles and books.

This study played an important role in identifying the factors related to schools as well as those related to students' home and other aspects that determine their educational achievements. It also revealed the skills developed during schooling and occupational success and several other such aspects pertaining to the impact of schooling.

**Source:** About Project Talent (<https://www.projecttalent.org/about/overview/>)

### Activity 1

Read the objectives of the units of this course and assess your ability to carry out the activities required for meeting these objectives. Are you capable of carrying out all the activities? Which activities are difficult for you? Why? Write to us.

### Check Your Progress 2

Select the correct option for the following:

1. Learners are taught about specifics and then introduced to the general idea - true /false
2. Content analysis helps to visualise the structural relations among the constituent parts of a concept-true /false
3. Previewing a video helps summative evaluation-true /false
4. Formative evaluation improves a courseware while it is developed-true /false
5. Summative evaluation improves a courseware after its development and delivery-true /false
6. Board examination is a type of formative evaluation-true /false

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## 2.9 SUMMARY

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This unit describes the steps taken for designing courseware. Designing courseware begins with the process of need survey. Data collected from the target group is analysed to determine learning needs and demographic details of the target group. After that instructional goals are set and objectives are derived from goals and stated using action verb. After that media for delivering courseware is selected and the content to be taught is selected and organised through content analysis and task analysis. Next content is developed and that available is used for attaining the instructional goals. Thereafter formative evaluation is carried out during the development of courseware for quality assurance, and summative evaluation is carried out after the delivery of courseware for determining its effectiveness.

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## 2.10 UNIT END ACTIVITIES

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Think of a course that you would like to teach.

1. Prepare a questionnaire/interview schedule to carry out a need survey for the course.
2. Develop instructional goals for the course.
3. Select the media for delivering the course and justify the selection.
4. Carry out content &/ task analysis and develop instructional objectives for any one part of the content/task.
5. Develop a plan for the evaluation of the courseware.

You may carry out these tasks with your peers.

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## 2.11 REFERENCES AND SUGGESTED READING

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## 2.12 ANSWER TO CHECK YOUR PROGRESS

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### Answer to Check Your Progress 1

1. a, b & c
2. b& c. This is because a does not clarify which aspects of educational technology learners will learn. The first one therefore lacks ‘specificity’.
3. a

### Answer to Check Your Progress 2

1. False 2. True 3. False 4. True 5. True 6. False