

Steps in curriculum development

Curriculum development requires a systematic approach to make it relevant to all programmes and courses. Curriculum development is an evolutionary process. Before the curriculum is finalized, it has to be put through a series of developmental stages. The figure below indicates the process that consists of five stages or steps to arrive at the final curriculum.

Stage	Development activity
<ul style="list-style-type: none"> • Goal Specification 	Identification and specification of instructional objectives
<ul style="list-style-type: none"> • Planning 	Writing outlines Specification of scope Content sequence Selection of teaching-learning strategies Identification of reading and reference material
<ul style="list-style-type: none"> • Validation 	Evaluation by expert bodies
<ul style="list-style-type: none"> • Field testing 	Determine optimal conditions of programme use Study links with other classrooms Institutional operations
<ul style="list-style-type: none"> • Quality control 	Refine curriculum for larger adoption

Figure 1 Stages of curriculum development

The curriculum development process normally begins with the task of identifying the **specific objectives** of teaching a particular course of the programme. The importance of setting specific objectives is that they act as broad parameters for making all further decisions regarding content selection, time allocation, assignment of credits, etc. Each course or programme can have very different purposes. For example, a course in Physics at the under-graduate level, may aim only at developing the basic knowledge and understanding of related concepts and ideas. At the post-graduate level, the purpose of the course will be to develop the capabilities of application and analysis. At the advanced level, the learner is expected to synthesise the knowledge obtained from diverse sources and perhaps even generate new ideas. It is the instructional objective, which guides us in the scope of a particular course of study, its breadth and depth, and the expected learning outcomes on the part of the students when they complete the course of study successfully.

Practices followed in Indian universities indicate that formulation of instructional objectives is left to individual teachers and examiners to examine the underlying objectives and orient their teaching activities accordingly. This is a great opportunity for exercising autonomy and deciding the scope of a particular field of study and on the quality of teaching skills and evaluation of students with ingenuity.

The route to using this opportunity is to identify the instructional goals clearly at the onset in departmental settings to avoid leaving it to individual interpretation; especially at the undergraduate level where external examination is involved.

The core activity in curriculum development process is working out the content that will help achieve specific objectives for each course. This involves a series of **sequential** actions as follows:

Step 1: Specification of the scope and contents of instruction.

Step 2: Writing content outlines.

Step 3: Specification of the relative weightages for the different content items within a course, in times of instructional time allocation.

Step 4: Selection of the teaching-learning strategies such as classroom teaching, practicals, demonstrations, field work, self study, library work, tutorials, seminars, group discussions and so on.

Step 5: Development of instructional material /identification of reading and reference material.

Step 6: Specification of evaluation procedures.

Self-assessment

1. Examine the framework of any course you are teaching and see if it broadly adheres to the above six dimensions of effective curriculum development. Write your observations.

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Mechanics of curriculum development

Decision-making process with regard to curriculum must be a cooperative and not an individual concern. The courses to be taught and their contents are of equal importance to teachers, students, administrators, subject experts and members of the community. Several questions remain unanswered today, two of the main being:

- How are the Indian universities operationalising the collective process of decision-making with respect to curriculum development?
- What are the specific roles played by each of the stakeholders in this process?

Universities adopt varying patterns and no single description can capture the process of curriculum development. As this directly affects the work of the teacher, it necessitates a closer study.

The broad outlines of the curriculum framework adopted by any university are relatively stable. For example, issues such as whether the undergraduate course must consist of one major course and two minor ones, do not require periodic deliberation. But the crux of curriculum planning and development is individual course outlines because the frontiers of knowledge are constantly changing. This has a direct impact on the teaching-learning process as well as the quality of students graduating from the particular university.

The **Board of Studies** is the formal body where collective thinking on curriculum issues is generated. Teachers and subject experts examine the proposals made for revision of existing curriculum, inclusion of new courses, appointments of examiners and so on. The proposals approved by the Board of Studies are then placed before the Faculty.

The **Faculty** is comprised of teachers from a multi-disciplinary background and varying specializations and together represents the various teaching departments of any university. Members of the community are also a part of the Faculty, such as educationists, social workers, industrialists and others. The Faculty examines the suitability of the proposals made by the Board of Studies and makes recommendations.

In some universities, the proposals approved by the Faculty are placed for further examination and formal approval to the **Academic Council** or **Post Graduate Council**.

Curriculum development activity	Responsibility
<ul style="list-style-type: none"> ● Course formulation – form and substance of the course 	Subject teachers/expert
<ul style="list-style-type: none"> ● Examining the form and substance of the course from the disciplinary angle 	Board of Studies
<ul style="list-style-type: none"> ● Examining the relevance and placement of the Course in an interdisciplinary perspective 	Faculty
<ul style="list-style-type: none"> ● Examining the broad policy implications 	Academic Council/Council of Post Graduate Studies

Figure 2 Summary of activities/ responsibilities of the curriculum development team in the universities.

Description in the above figure is broad and generalized. The constitution of the bodies and the procedures for processing the proposals will differ from one university to the other. By and large, curriculum related issues in most universities involve a cross-section of people. This is particularly necessary in the Indian context of higher education where affiliation to a central institution necessitates a common course of studies and an external examination to be followed by all institutions seeking the affiliation. While this reasoning seems sound, it still leaves some questions unresolved:

- Are these formal bodies able to understand and accommodate the ideas and aspirations of the students?
- Do these bodies have adequate representation of practicing teachers or do Heads of Departments, Deans and Principals who really belong to the administrative section overburden them?
- Are these formal bodies efficient enough to elicit and incorporate the perceptions of the community?
- These bodies are primarily focused on examining the proposals in form, but who ensures the quality of the substance of the curricular input is up to the mark?

To conclude, we can say that curriculum development is not a mechanical process. It requires collective thinking and decision making along with individual enthusiasm, dedication and experimentation. The challenge for curriculum developers in any university is balancing the diverse interests of many members. It is the teacher who ultimately transacts the course inputs and should play a major role in this process. As yet, this is to happen.

SYSTEMS APPROACH

Educational technology makes available a wide range of instructional media at the curriculum planning level. The instructional process has become so complex these days because of the shift in technological focus from the classroom to curriculum planning. The number of objectives to be reached as a result of the instructional programme has increased. The amount of material to be taught and the media to be utilized has also enormously increased. The number of students and teachers involved in the total instructional system has also increased by leaps and bounds. In such a situation, there is great need for comprehensive and detailed planning. The curriculum should not specify any student behavioural objectives but should also suggest the strategies for helping the students to reach the objectives and evaluation instruments to measure their success. This is called the systems approach, an operational planning concept, borrowed from the engineering sciences and cybernetics, which deals with self-regulating and self-sustaining systems.

Definition of a system

Websters dictionary defines a system as "a regularly interacting or independent group of items forming a unified whole". A system is "a group of objects related or interacting so as to form a unity". It also defines a system as "organized or established procedure", or "a methodically arranged set of ideas, principles, methods or procedures". Systems analysis essentially is a systematic way of identifying goals of any system and scientifically working out different steps to move towards these goals suggesting 'models' for application.

The approach in general includes the following steps:

- a. An analysis of the existing situation,
- b. Setting up of goals for the desired situation,
- c. Defining mechanisms to evaluate the achievements of goals,
- d. Generating alternative solutions,
- e. Choosing the best possible solution through cost-benefit analysis,
- f. Detailing the design of the system,
- g. Outlining the monitoring mechanisms for the system, and
- h. Working out the solution.

Systems approach is a rational problem-solving method of analyzing the educational process and making it more effective. System is the process taken as a whole incorporating all its aspects and parts, namely: pupils, teachers, curriculum content, instructional materials, instructional strategy, physical environment and the evaluation of instructional objectives. Hence, it may be seen that the purpose of the system analysis is to get the "best equipment in the best place for the best people at the best time and at the best price". "The systems approach in instruction is an integrated, programmed complex of instructional media, hardware and personnel whose components are structured as a single unit with a schedule of time and sequential phasing".

Components of an Instructional System

System approach is a systematic attempt to coordinate all aspects of a problem towards specific objectives. In education, this means planned and organized use of all available learning resources, including audio-visual media, to achieve the desirable learning objectives by the most efficient means possible. The systems approach focuses first upon the learner and the performances required of him. Only then it makes decisions regarding course content, learning experiences and the most effective media and instructional strategies. Such a system incorporates within itself the capability of providing continuous self-corrections and improvement. It is concerned with all elements of instruction including media. Its purpose is to ensure that the components of the organic whole will be available with the proper characteristics at the proper time to contribute to the total system fulfilling the objectives.

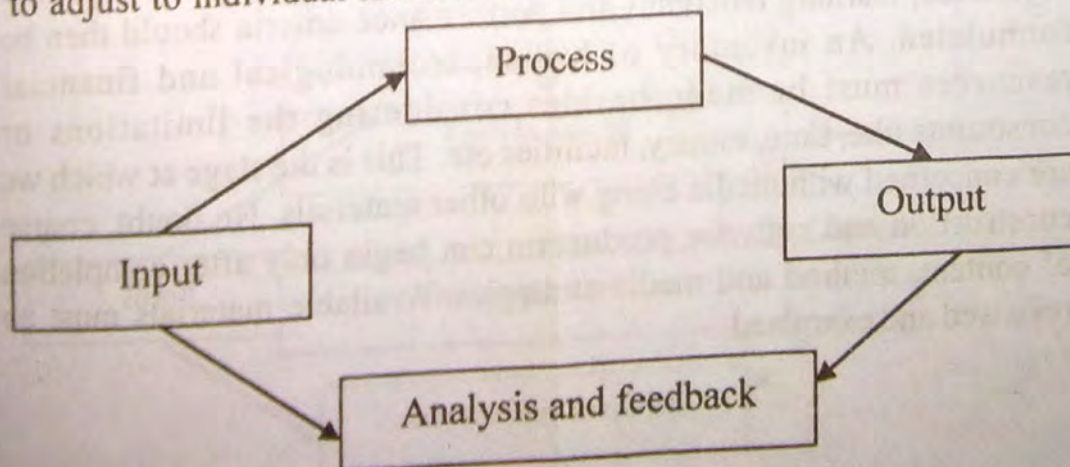
The procedural steps in the systems approach in education are as follows:

1. Defining instructional goals, behavioural objectives and starting them in operational, measurable terms.
2. Determining functions related to the achievements of these goals by proper aids like films, recordings, videotapes, etc.
3. Defining learner characteristics and requirements.
4. Choosing appropriate methods suitable for effective learning of the topic.
5. Selecting appropriate learning experiences from many alternatives available.
6. Selecting appropriate materials, facilities, equipments, resources, environment, tools required for student experiences.
7. Defining and assigning appropriate personal roles—teachers—

- team teaching members—supporting personnel—students.
8. Implementing the programme—test with a few pupils in typical and appropriate condition.
 9. Testing and evaluating the outcome in terms of original objectives measured in student performance.
 10. Refining and revising if necessary to improve production and efficiency of the system to improve student learning.

In an instructional system, the teacher or instructor and the resources made use of by him are included as components of the system. There is provision for continuous evaluation and self-correction, for realizing the stated objectives. In the systems approach to instruction, the teacher has to plan completely the utilization of selected resource material and the classroom activities (each pupil working alone; small groups of pupils, 4 to 6, working alone or with teacher guidance; large groups working alone; very large groups requiring the use of mass communication media). The teacher should have a good overall view of the subject, know his/her limitations, know all about his/her pupils and the individual differences in their learning capacities and plan accordingly. The systems approach involves continuous evaluation of learning outcomes and utilization of knowledge gained by analysis of results of evaluation to suitably modify the plan of approach to achieve the stated objectives.

In brief, the systems approach applied to educational situations involves the following interlinked and interdependent stages: (a) Explicitly stated standards of outputs performances; including sequenced behavioural objectives and post test; (b) Planned input and processes involving structural learning materials and methods suitably geared to the needs of a particular group of learners; (c) Monitored output which is used to revise, improve and evaluate the instructional system, providing feedback to the learner and teacher; and (d) A degree of in-built flexibility to adjust to individual situations.



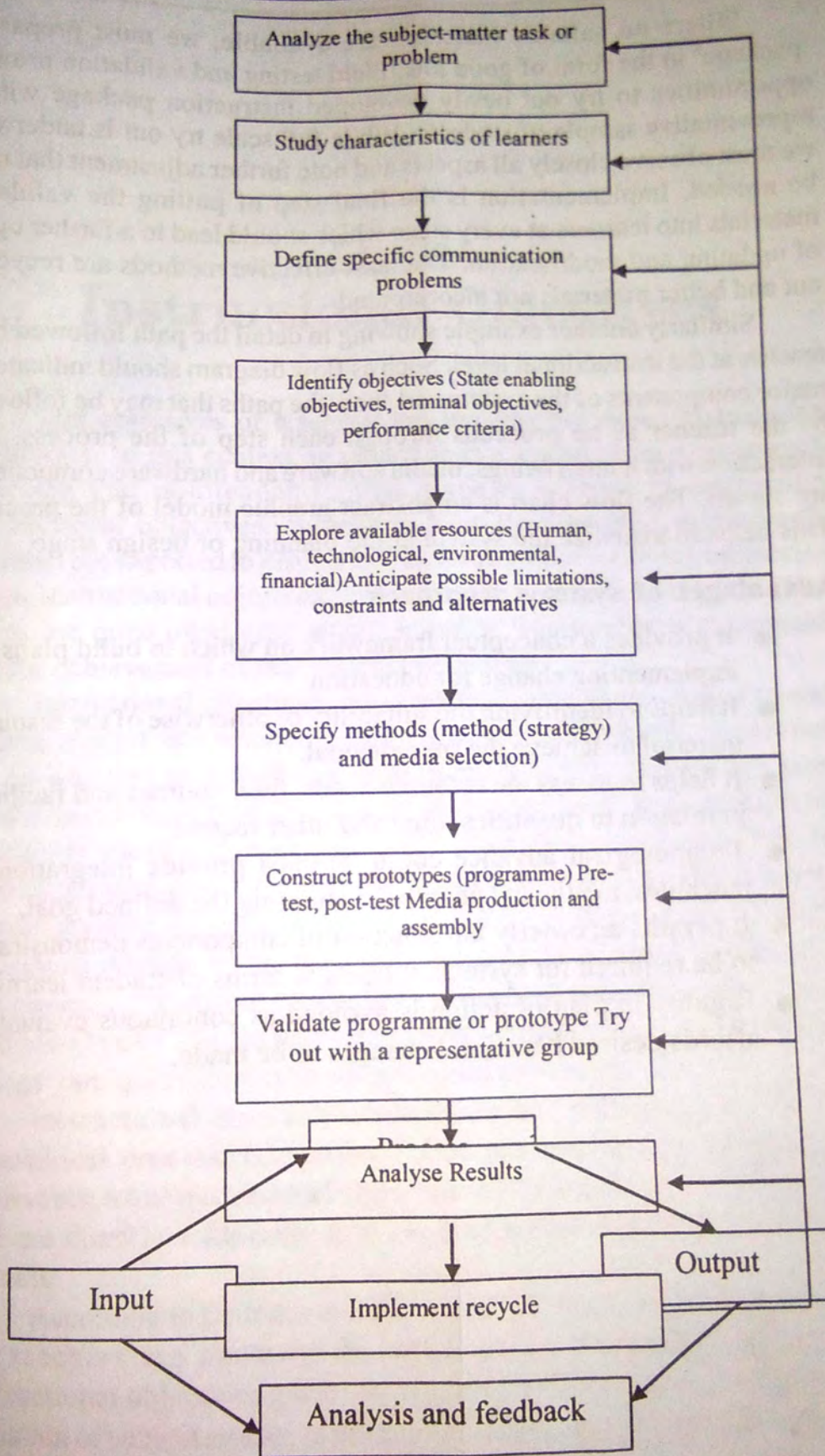
For maximum effectiveness, it is necessary to consider the system a whole remembering the interaction and inter-dependence of the components of the systems. Full details and specifications about the interacting factors should be clearly defined. Systems approach in education may be applied to institutional planning and development in its varied aspects (macro level) or it may be used at the classroom level with its concern of a specified topic during brief period (Micro level).

Curriculum objectives in terms of anticipated change in student behaviour should be well-defined. Teacher and pupils should know what is expected upon completion of an instructional unit. The evaluation should aim to reflect pupil's skills knowledge, concepts developed through available teaching material and the teacher. Based on evaluation results, more appropriate instructional materials and teaching strategies could be selected to ensure achievement of stated objectives. It may be necessary also to change the prescribed entry behaviour of input based on the results of evaluation. The curriculum should be modified if end-product is not suitable to fill in the need.

Flow Diagram for Designing a System

Planning is fundamental for systems can be easily represented by drawing a map called a flow diagram. The relationship between the input (pupils), instructional strategy (process) and the output are shown by means of the simple flow diagram.

A more extended example showing in detail the path followed in general at the macro-institutional level can also be illustrate in the form of a flow diagrams as shown here. Suppose we wish to develop a new course or instructional unit according to the systems concept. We should begin with a survey and analysis subject-matter identifying the skills to be learnt and the characteristics of the learners. The specific objectives, learning outcomes and performance criteria should then be formulated. An inventory of human, technological and financial resources must be made besides considering the limitations or constraints like, time, money, facilities etc. This is the stage at which we are concerned with media along with other materials. No doubt, course construction and software production can begin only after completion of content, method and media strategies. Available materials must be reviewed and examined.



Where no suitable materials are available, we must prepare a 'package' in the form of good kits. Field testing and validation provide opportunities to try out newly developed instruction package with a representative sample of students. While full scale try out is underway, we must observe closely all aspects and note further adjustment that may be needed. Implementation is the final step of putting the validated materials into learners at every stage which should lead to a further cycle of updating and modification. The least effective methods are recycled out and better materials are incorporated.

Similarly another example showing in detail the path followed by a teacher at the instructional level. Such as flow diagram should indicate all major components of the system and show the paths that may be followed by the teacher as he proceeds through each step of the process. His interaction with human beings, media software and hardware components are shown. The flow chart is an abstract graphic model of the process. This helps to visualize the system at the planning or design stage.

Advantages of systems Approach

- It provides a conceptual framework on which to build plans for implementing change for education.
- It helps to identifying the suitability or otherwise of the resource material to achieve the specific goal.
- It helps to assess the resource needs, their sources and facilities in relation to quantities, time and other factors.
- Technological advance could be used provide integration of machines, media and people for attaining the defined goal.
- It permits an orderly introduction of components demonstrated to be required for systems success in terms of student learning.
- Rigidity in plan of action is avoided as continuous evaluation affords desired beneficial changes to be made.

Formative and summative tests

In the previous section, we discussed one way of classifying tests and examinations as NRT and CRT, from the viewpoint of interpreting the results. We will now classify the tests and examinations from the viewpoint of the sequence in which they are likely to be used in classroom instruction. In colleges, teachers evaluate the performance of student even while they continue with the instruction, as also at the end of instruction. Very often, teachers put a few questions at the end of every class to review what is taught or when the teaching of a certain skill or a unit is complete. In colleges such tests are mostly teacher-made tests. This type of evaluation is called formative evaluation and the tests used for this are called *formative tests*. College teachers also administer tests to students at the end of a semester or course of instruction. This means that evaluation is done at the end of a course of instruction. Such a type of evaluation is called summative evaluation and the tests used for this are called *summative tests*. Let us now discuss in detail the need for formative and summative tests.

Need for formative and summative tests

Right from the beginning of formative assessment, there have been many attempts to adopt formative assessment to enable learners to understand their progress in learning, their weaknesses and to take the necessary remedial measures to correct learning. The need arises from the fact that there are individual differences in learning and in the quality of learning. Also, the pace of learning is different and so, the time within which a certain amount of learning is to be expected varies from person to person. The need for a formative assessment is to be seen in this perspective that in the matter of learning, a student needs to be assessed in order to provide information to him as to the quantum, quality, pace and amount of learning he has acquired, so that this acts as a feedback to him. The formative assessment is thus a feedback to the student. This feedback is to be seen in terms of cognitive, affective and psycho-motor characteristics included in his learning. Formative assessment also serves as a feedback to the teacher as to which part of the course is not clearly taught, and which objectives not clearly achieved. It is this feedback that makes formative assessment a useful mode of assessment and helps the teachers adapt their instructional strategies for improving students' achievement.

We have seen that formative assessment is to serve the twin purposes of feedback to students in monitoring the progress of learning and to the teachers on the efficacy of their teaching. The feedback to students is mainly to monitor the progress of learning when the learning takes place, either at an assumed rate of learning or at their own rate of learning. The problem of measurement in this context is to take care of the setting of standard level of achievement, against which 'students' own levels are compared. The formative tests, therefore, measure the students' learning levels against this standard set up in the test. The decisions that are taken, amount to the success or failure of any individual to come up to this standard. The strength of testing lies in revealing what has been learnt correctly and precisely. To get this information on the strength or weakness of the learning, on the part of an individual, is precisely the major purpose of formative assessment. Formative assessment, therefore, is not very meaningful in terms of marks. It becomes slightly more meaningful when grades are given and it becomes extremely meaningful when the results of the test are discussed with the students and the weaknesses of the learners are identified and remedial measures suggested. Traditionally, such formative assessment has taken the format of oral test at the end of every class or a test used at the end of module or unit or even a test for testing the mastery and acquisition of a certain ability. This may take the form of a 'paper-pencil' test, a skill test or an oral test. Whatever be the form, its main purpose is to draw attention to the weaknesses of learning and the remedial measures with which to improve upon.

includes instructions, safety checks, diagnostic questions and remedial loops, all in one package easily comprehensible to students. In such a formative testing the emphasis is on diagnostic questions and responses of the students to those, so as to bring forth the weaknesses of learning.

In the comprehensive learning package mentioned above, remedies for a set of assumed weaknesses of learning are also suggested. Another format is to use a programmed instruction (learning) approach, which consists of a self-paced learning material component in addition to what is contained in the flowchart. In the programmed instruction (learning) sequence, formative evaluation is built in; so not only does the learning take place in steps, but it is also checked in steps, and remedied in steps. (See section on programmed learning (PLM) in Unit 3 of Block 1.)

Formative-diagnostic oriented assessment in any format requires a plan- a table of specifications indicating the level of abilities and the specific content area.

Need for summative tests

Summative tests are usually given at the end of a course a semester. It could be used at the end of a unit of instruction when purpose is to grade the students. Unlike the formative test, the aim here is not to monitor the progress of the students during instruction but to assess and grade the over all performance of the students at the end of a term, semester or the course in order to determine the extent to which the instructional objectives have been achieved. This also helps the teacher to do course evaluation.

The second important objective of summative evaluation is to assign course grades or certify pupils in terms of the intended learning outcomes (ILOs). This ensures the students' promotion to the next task or course. And this in turn facilitates in classifying students' according to their abilities, and their selection for different purposes, such as admission to a new course, selection for a particular job, etc. the techniques used in summative evaluation are determined by instructional objectives, but they typically include teacher-made achievement tests, ratings on various types of performance (e.g. reports). Though the main purpose of summative evaluation is the certification of pupil achievement, it also provides evidences for judging the appropriateness of content (syllabus), the course objectives and the effectiveness of the instruction. It helps to validate the whole teaching-learning process.

Distinction between formative and summative tests

i) Purpose of evaluation

The main purpose of formative evaluation is to determine the degree of mastery of a given learning task, and also that part of the task that has not been mastered. Thus the emphasis is not on grading or certifying, but on helping both the learner and the teacher to improve the teaching-learning process. Summative evaluation, on the other hand, is directed towards a much more general assessment of the degree to which the larger and more general outcomes of learning have been achieved over the entire courses or a substantial part of it. To cite an example, at the end of a first semester in Physics, (electricity and magnetism) summative evaluation will have the major objectives of determining the degree to which the students have learnt to interpret the various principles and concepts, and also to apply them to new or unfamiliar situation. The purpose, therefore, is to grade the students and report to the administrators. On the other hand, the purpose of the formative evaluation, in one unit dealing with electromagnetic induction, will be to determine whether a student has learnt to define, interpret, translate and apply the principle of electromagnetic inductions. If the learner is not successful in doing this, he is given further support material and resource to learn to do such things. Certainly here, the major purpose is not to grade him or certify his learning but to get and provide feedback to learner, and improve teaching-learning strategies. A teacher can and should use both formative and summative evaluation for their appropriate purposes.

ii) Periodicity of evaluation

Another distinction is that tests for formative evaluation are given at regular and frequent intervals, while for summative evaluation, they are given at the end of considerable learning over a fairly long period of time. In a course that extends over a period of sixteen weeks, a test at the end of every week is a formative test, while the test at the end of sixteen weeks of learning, will be summative. A test at the end of a teaching unit/topics formative while an annual test, a semester end or course end tests are summative since they are used for grading/promotion/certification.

iii) Level of generalization-transfer of learning

Perhaps the level of generalization will be the factor that differentiates formative from summative more sharply. While in formative evaluation one may be interested in assessing knowledge, skills or the ability to apply a given principle in an unfamiliar situation, in a limited context, in the summative evaluation, one may try to assess the acquisition of knowledge, skill or the ability to apply it in a wide variety of situations that integrate several principles covering bigger chunk of syllabus. Focus of formative evaluation is on assessment of students' competencies related to a restricted sample of content or selected chunk of syllabus. While in summative evaluation, the population of items is large due to much bigger chunk of syllabus to be covered. Therefore, There is a higher probability of sampling error. Hence the marks/ grades obtained in summative evaluation suffer from the sampling limitations.

Planning summative evaluation, therefore, requires a careful process of sampling not only the content, but also the abilities specified under various assessment objectives. This is usually done through a table of specifications. Such a table should not only indicate the topics separately but also their integration wherever desired. The validity well as the assessment objectives and the proportional weightage given to different content areas and abilities (implied in assessment objectives) to be tested in an integrated form. Content validity and curricular validity are thus, built into framework of summative evaluations.

Types of formative and summative evaluation

The types of formative and summative evaluation tools can take the form of:

- i) written or oral quiz (announced or unannounced)
- ii) short duration objective type tests consisting of items of Constant Alternative (CA), Multiple-choice (MC), Multiple Facet (MF), Matching (M), Multiple Completion (MC) Rearrangement ® and Combined Response (CR) variety
- iii) fixed response-open ended questions
- iv) short answer questions
- v) short essay type questions (restricted response essay questions)
- vi) practical exercises.

In formative testing as pointed out earlier, the emphasis is on checking learning, locating the weaknesses of learning and therefore suggesting remedial steps for improving the learning. The summative evaluation can take the form of a judicious combination of objective type items, short answer questions and long answer questions for better sampling of syllabus. Such a combined form may look similar to the one described in the earlier unit (i.e. Unit 12). In a nutshell focus of formative testing is on diagnosis, feedback, remediation and improvement of students' achievement whereas summative testing is judgemental in nature with focus on measurement of achievement, grading and certification of achievement.