Gagne's Hierarchy of learning

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Robert Gagne was an American educational psychologist whose ideas of conditions of learning and instructional design implications were first introduced in 1965. Gagne proposed a system of classifying different types of learning in terms of the degree of complexity of the mental processes involved. The assumption is that different types of learning exist and that different instructional conditions are most likely to bring about these different types of learning.

. While Gagne's learning blueprint can cover all aspects of learning, the focus of the theory is on the retention and honing of intellectual skills. The theory has been applied to the design of instruction is all fields, though in its original formulation special attention was given to military learning settings.

Types of Learning: Gagne identified eight basic types of learning and arranged them in a hierarchical order. According to Gagne, the higher orders of learning in the hierarchy, are build upon the lower levels, requiring progressively greater amounts of previous learning for their success. The lowest four orders tend to focus on the more behavioural aspects of learning, while the highest four focuses on the more cognitive aspects. These are-

1. **Signal Learning:-** It is a generalized response to a signal or stimulus. Like a dog responding to a command. This is the simplest from of learning and consists essentially of the classical conditioning suggested by Pavlow. In it responses are diffuse and emotional and the learning is involuntary.
2. **Stimulus Response learning:**- Involves precise respone to a precise or specific stimulus based on Skinner's operant conditioning principles. Here a stimulus is properly discriminatedfor a mechanical alike response. We learn to respond in a particular way for being rewarded or punished. Thus the responses are voluntary in nature.

3. **Chaining:-** This is more advanced form of learning in which the subject develops the ability to connect two or more previously learned stimulus **response bonds into** a linked sequence. It is the process where by most complex psychomotor skills (eg. riding a bicycle or playing a piano) are learned.
4. **Verbal Association:-** This is a form of learning in which the links between the items being connected are verbal in nature. Verbal association is one of the key processes in the development of language skills. E.g poem recitation, singing a song etc.
5. **Discrimination Learning:-** The next type of learning in the hiearchy is discrimination learning. This is the process in which we learn to discriminate between the stimuli which are too similar in nature. It involves developing the ability to make appropriate (different) responses to a series of similar stimuli,that differ in a systematic way. The process is made more complex by the phenomenon of interference whereby one act of learning inhibits other. Interference is thought to be one of the main causes of forgetting.
6. **Concept Learning:-** In this type of learning one learns to provide a common response to a class of stimuli. It forms the basis of the ability to generalize, classify etc. Gagne breaks concept learning into two stages- concrete and abstract. In concrete concept learning we learn to form concept based on direct observation of phenomenon in the world around us. e.g. we observe coins and wheels and form the concept of circular. But some concepts are abstract in nature. Examples of abstract concepts are '**cousins or 'city' or 'justice'**. We cannot arrive at the concept of cousin simply by observing a number of cousins. We need to compose a definition that explains what makes these people cousins.
7. **Rule Learning or Principle Learning:-** A very high level cognitive process that involves being able to learn relationships between concepts and apply these relationships in different situations, involving situations not previously encountered. It forms the basis of the learning of general rules, procedures etc. In learning a rule we relate two as more concepts e.g. constructing a sentence, playing a game.
8. **Problem Solving-** This in the highest level of cognitive process according to Gagne. It involves developing the ability to invent a complex rule, algorithm or procedure for the purpose of solving one particular problem, and then using the method to solve other problems of similar nature.

Outcomes of learning:-Gagne assumed that there are different types of learning outcomes, each of which is best achieved through its specific instructional design, but also that there is a set of steps required in every learning environment (sometimes also known as **cognitive** assumption).
Gagne classified the learning outcomes falling under the three domains of behaviour (cognitive affective and psychomotor). Learning helps us to make a required change in the all the three domains of behaviour **resulting** in development of human capabilities in terms of the following five components.

1. Verbal information
2. Intellectual skills
3. Cognitive strategies
4. Motor skills
5. Attitudes

1. **Verbal information:-** Verbal information is concerned with declarative knowledge (e.g. facts, information, names, places, etc.). Such a verbal information is acquired through (listening, viewing and reading) and can be transmitted to others, using verbal means (spoken or written). To assist learning of verbal information, the instructor may teach students using different mnemonic techniques (e.g. keyword, loci, imagery etc.) and help students, relate new information to what already exists in memory to make learning meaningful and memorable.
2. **Intellectual skills:-** Intellectual skills involves the procedural knowledge (how to do things). The intellectual skills are further subdivided into different levels of learning involving – discrimination, concept formation (concrete and defined concepts) rule learning and problem solving.
3. **Cognitive strategies:-**These refer to the internally organized capabilities of a learner which he acquires through the process of learning. Learning strategies include rehersal(verbally repeat, underline or copy materials) elaborations (associate new information with the existing one through paraphrasing, summarizing, note taking and questions and answers) and **organizing (arrange** material in an organized and meaningful order through outlining, concept mapping, advance organizer etc.) These

strategies help in the tasks related to attending, learning, remembering, thinking and problem solving, leading him to attain his individual and social goals.

4. **Motor skills:-**Motor skills pertaining to psychomotor domain of behaviour are sequences of motor responses or movements, which **are combined** into complex performances. These physical performance are assessed by rapidity, accuracy, force or smoothness. e.g. dancing, skateboarding, swimming, playing musical instruments etc.

5. **Attitude:-** Attitude pertaining to affective domain, is an internal state that affects personal choices and actions over an object, person, event and so on. Although it is a complex human state, it can be measured by observing the person's choice **or**action.

Table:- Description of Gagne's outcomes of learning

	Learning outcomes	**Examples related to outcomes**
1.	Verbal Information	Learning the alphabets,
2.	Intellectual skills	Addition and subtraction, working with fractions, categorizing fruits and vegetables
3.	Cognitive strategies	Inductive and deductive reasoning -exploring the action of a magnet.
4.	Motor skills	Learning to play guitor, fastening button inserting contact lens
5.	Attitudes	How one feels about reading a book

Events of learning and Instructions:- Gagne, while emphasizing the need for a proper theory of instruction, proposed that such a theory of instruction must be based on the hieararchical **structure** of the events of learning. How the information is processed by the learner may work toward planning the task of instruction (either for self learning or through an instructor or teacher).

Skills are to be learned at the lowest level and mastered before proceeding. An instructor should use positive reinforcement and repetition, with each new skill building upon previously acquired skills.

Steps of planning instruction:-

1. Identify the types of learning outcome. Each outcome may have prerequisite knowledge, or skills that must be identified.
2. Identify the internal conditions or processes the learner must have to achieve the outcomes. (previous learning, physical stamina, mental and emotional makeup).
3. Identify the external conditions or instruction needed to achieve the outcomes.
4. Specify the learning context
5. Record the characteristics of the learner.
6. Select the media for instruction
7. Plan to motivate the learners
8. Test the instruction with learners in the form of formative evaluation

9. After the instruction has been used, summative evaluation is used to judge the effectiveness of the instruction.

Table:- Gagne's learning Events with their corresponding instructional events.

	Learning event (Cognitive process in a learner's mind)	**Corresponding Instructional event**
1.	Reception	Gaining attention
2.	Expectancy	Informing leaners of the objectives
3.	Retrieval	Stimulating recall of prior learning
4.	Selective Perception	Presenting the stimulus
5.	Semantic Encoding	Providing **learning g**uidance
6.	Responding	Eliciting performance
7.	Reinforcement	Providing feedback
8.	Retrieval	Assessing performance
9.	Generalization	Enhaancing retention and transfer

An instructional plan may thus be properly chalked out by followingthe sequences of learning events. For the illustration of his views about the relationship between learning events and instructional events Gagne (1985) provided the examples of events for each category of learning outcomes.

Nine events of **instruction a**re the starting point for every type of learning and every instructional design.

1. **Gaining Attention (Reception):-** The first step is to give students attention and motivate him to engage with the content- (**gesture**, voice, showing video etc.).
2. **Inform objectives (Expectancy):-** Students needs to be clarified what they can expect, **how their learning** is going to benefit them.
3. **Stimulate recall of prior knowledge (*Retrieval):-*** Prior knowledge should be activated since it is important for learning new materials.
4. **Present stimulus material (Selective perception):-** Present the material to students, possibly using various learning styles and media.
5. **Provide learner guidance (Semantic encoding):-** Guidance in terms of communication enables the teacher to direct the students in their learning or enable them easier information encoding through visual or other materials.
6. **Elicit performance (responding**):- Students need practice, practice should immediately follow instructions and be well defined in terms of its nature objectives and expected student responses. At this stage, you need to ensure that students can demonstrate their knowledge of what you have taught them**.**
7. **Provide Feedback (reinforcement):-** Feedback is additional guidance, offering the student immediate evaluation of his performance enabling him to realize his mistakes and misconceptions.
8. **Assess performance (Retrieval):-** At the end of each course student's knowledge should be assessed in order to check if required learning has **occured.**
9. **Enhance retention and transfer (Generalization):-** The learning process does not end when the class does. The teacher should advise students, how and in which context to apply and transfer the **just gained knowledge in the world outside the classroom.**

Educational Implications:

1. Gagne's hierarchy can be used for designing instructional technology involving analyzing requirements, selecting media and designing the instructional events. He outlined the several steps that should be used to plan and design instructions:-
    i. Identify the types of learning outcome- each outcome may have prerequisite knowledge or skills that must be identified.
    ii. Identify the internal conditions or processes the learner must have to achieve the outcomes.
    iii. Identify the external conditions
    iv. Specify the learning context
    v. Select the media for instruction
    vi. Plan to motivate the learner
    vii. Use of formative and summative evaluation to judge the effectiveness of instruction.
2. It can be used for designing instruction as in all domains of human behavior
3. Gagne's hierarchy provided a genuine basis for the proper organization and sequencing of instructions.
4. Helps the teacher to select suitable content or units of teaching or learning.
5. Helps in selecting appropriate teaching technology based on instructional objectives.
6. Helps the teacher to decide what lower behaviours or subordinate skills should be taught, before teaching higher learning types.
7. Helps the teacher to break a complex task into component skills and teach those skills which the students are lacking.
8. Textbooks can be produced on the basis of the task analysis of learning objectives.
9. Teacher can provide necessary conditions under which the student can learn more – responding, guidance, retrieval, reinforcement etc.

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