### Gagne's Types of Learning Outcomes

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<tr>
<th>Type</th>
<th>Definition</th>
<th>Application</th>
<th>Steps involved</th>
<th>Learning objectives</th>
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<td><strong>Declarative Knowledge</strong></td>
<td>Declarative knowledge objectives require a learner to recall in verbatim, paraphrased, or summarized form facts, lists, names organized information. Learners are not required to apply the knowledge that they have acquired but merely to recall, recognize, or state it in their own words.</td>
<td>Schooling or training that starts and stops at recall of facts and memorization of lists falls far short of students' needs. However, knowing declarative knowledge helps students learn higher-order, more complex objectives such as intellectual skills.</td>
<td>Need to reflect whether learning will be recognition (choosing from options) or recall, verbatim or paraphrased and listed or summarized.</td>
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<td>Intellectual skills are typified by the application of rules to previously unencountered examples. Students learn how to not only recall, but also to apply knowledge to instances not encountered during instruction.</td>
<td>Intellectual skills build on each other, that is, they are hierarchical. Learners must be able to make discriminations among objects before they can identify concrete concepts. They must have acquired the concepts that are used in rules, and they must have acquired the rules they will combine in unique ways to create domain-specific problem solving.</td>
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<td>When learners learn to differentiate between two stimuli (visual, auditory, tactile, olfactory, or gustatory) they have learned to make discriminations -the ability to perceive that something either matches or differs from other things.</td>
<td>Discriminations are fundamental to learning; however we rarely teach them by themselves in school or training environments because discrimination are simply the ability to tell whether things are alike or different, not the ability to recognize these things as members of a large class of entities with a particular name.</td>
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<td>The ability to classify things into categories by their physical characteristics -whether visual, auditory, tactile, olfactory or gustatory is the ability to identify concrete concepts. Concrete concept learning differs from discrimination in that if learners have acquired a concrete concept, they can identify examples of that concept.</td>
<td>The acquisition of concepts helps the learner to simplify the world. Grouping thinks into categories makes us more efficient thinkers</td>
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| Intellectual Skills | Concepts that are classified by whether they match a definition or a list of characteristics are known as defined concepts. | Learners who have acquired defined concepts are able to classify previously unencountered examples and nonexamples of the concepts. | 1. Recalling the critical attributes of a concept  
2. Sequentially or simultaneously comparing attributes of an instance to attributes of the concept | Concept objectives should reflect the learners' ability to classify and label ideas, objects, and events as examples and nonexamples of a concept. They may require that the learner state how/why such classification was made. |
|---|---|---|---|---|
| Principles or relational rules can typically be expressed in the form of if-then statements. | Relational rules help us to predict, explain, or control circumstances in our environment by describing either natural or volitional responses to those circumstances. | 1. Determine which concepts or variables are involved  
2. Determine the principle that relates those concepts or principles  
3. Recall the principle  
4. Determine which concept or variable has varied and the direction or magnitude of its variation  
5. Determine which concept or variable has been affected  
6. Then determine the magnitude and direction of the effect on the affected concept or variable  
7. Confirm that the value is reasonable | Should reflect the intention that the learner can use the principle to predict, explain, or control something. The objectives may require that learners explain their application of the principle. Occasionally, objectives may ask students to recognize whether a rule was correctly or incorrectly applied and tell why or why not. |
| Procedures tell us in what order certain steps should be taken. More complex procedures may have sub-procedures based upon decision steps. | 1. Determine whether a particular procedure is applicable  
2. Recall the steps of the procedure  
3. Apply the steps in order, with decision steps if required  
4. Confirm that the end result is reasonable | Describe what learners can do to demonstrate that they can successfully complete a procedure defined by a procedural rule. |
Problem solving refers to a learned capability involving selection and application of multiple rules.

Learners must select from a number of possible rules, whether relational or procedural, and apply those rules in a unique sequence and combination to solve a previously unencountered problem. Once the learners have acquired the ability to solve problems in a specific domain, they may apply that ability to similar types of problems.

1. Determine the knowns, the givens
2. Determine the unknowns, the problem
3. Determine the class of problems to which this problem belongs
4. Determine the relational rules that relate the knowns and unknowns in the situation
5. Determine the procedural rules that determine the application of the relational rules
6. Apply the procedural rules and the nested relational rules
7. Confirm that the problem is solved; unknowns are determined.

Should reflect the requirement that the learner do the following: a) assess the problem situation, b) determine which rules are applicable and c) synthesize these rules to solve a particular problem.

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<th>Cognitive Strategies</th>
<th>Strategies used by students to manage their own learning. Winstein and Mayer organized these strategies into five major categories:</th>
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<td>a) rehearsal strategies are used for basic learning tasks and complex learning tasks that aid in selection of information to be recalled and enhance retention of that information,</td>
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<td>b) elaboration strategies are used for basic learning tasks and complex learning tasks that tie new information to prior knowledge,</td>
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<td>c) organizational strategies are used for basic learning tasks and complex tasks that select information to be retained and define the relationships among this information so that it may be integrated into memory</td>
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<td>They are particular evident when students are completing problem-solving tasks. Usually students discover these strategies.</td>
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1. Determine the characteristics and requirements of the learning task
2. Select or invent strategies appropriate for the task
3. Select the optimum strategy
4. Apply the strategy
5. Evaluate the effectiveness of strategy
6. If strategy fails, modify the strategy or select another strategy

Require that the learner do the following: a) assess the learning task, b) select (or invent) a strategy appropriate to the task, c) apply the strategy, d) assess the success of the strategy and e) modify the strategy if necessary.
d) comprehension monitoring strategies are sometimes referred to as metacognition, or "students' knowledge about their own cognitive processes and their ability to control these processes by organizing, monitoring, and modifying them as a function of learning outcomes".

e) affective strategies are those strategies that learners use to focus attention, maintain concentration, manage performance anxiety, establish and maintain motivation, and manage time effectively.

| Attitudes | Instruction in attitudes in schools and training settings is often subtle and indirect. This is not say that instruction cannot be designed for attitudes and other learning outcomes in the affective domain. Some materials such as simulation games, films or videos are powerful tools for influencing learners' attitudes. The way in which instruction is conducted inevitably generates attitudes about the material being learned, whether there are affective objectives in the content or not. The constant feedback, reinforcement, and instruction adapted to an individual's level of proficiency that is possible in a well-developed individualized system of learning may positively influence learner both toward the content being taught and toward learning in general. | 1. Evaluate the situation, and consider possible courses of action 2. Determine which course of action is valued 3. Choose that course of action 4. Perform that course of action 5. If effective, continue using strategy; if ineffective, return to first step. 6. Must reflect what the learner must do to demonstrate acquisition of an attitude. They may also require that the learner tell why the performance is important. |
| **Psychomotor Skills** | Instruction may be designed to teach the procedures related to motor skills; however, psychomotor skills must be physically practiced to be learned. | 1. Determine whether a particular psychomotor action is required (although this may be automatic)  
2. Recall the steps of the procedure (although this may be unconscious)  
3. Execute the steps of the psychomotor procedure in order, with decision steps and consequent actions, if required  
4. Confirm that the steps have been correctly applied. | Should reflect what new muscular activities are required. The standards often reflect time or speed or consequences or number of times the learner must correctly execute the motions. |
| **Learning Enterprises** | This type of learning reflects capabilities that combine types of learning into more general expertise. It is defined as a purposive activity that may depend for its execution on some combination of declarative knowledge, intellectual skills, and cognitive strategies, all related by their involvement in the common goal. | | |