

Bloom's Taxonomy

In 1956, Benjamin Bloom headed a group of educational psychologists who developed a classification of levels of intellectual behavior important in learning. Bloom found that over 95 % of the test questions students encounter require them to think only at the lowest possible level...the recall of information.

Bloom identified six levels within the cognitive domain, from the simple recall or recognition of facts, as the lowest level, through increasingly more complex and abstract mental levels, to the highest order which is classified as evaluation.



Knowledge.

Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.

Comprehension.

Comprehension is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words to numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material, and represent the lowest level of understanding.

Application.

Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.

Analysis.

Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include the identification of parts, analysis of the relationship between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material.

Synthesis.

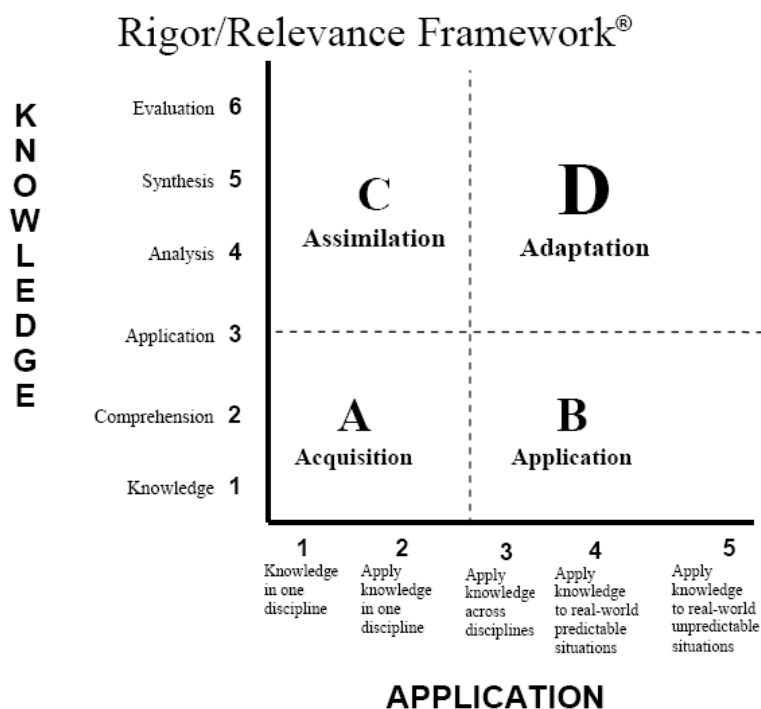
Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviors, with major emphasis on the formulation of new patterns or structure.

Evaluation.

Evaluation is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose. The judgments are to be based on definite criteria. These may be internal criteria (organization) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all the other categories, plus conscious value judgments based on clearly defined criteria.

Rigor and Relevance Framework

In 2005, Willard R. Daggett, Ed.D. of the International Center for Leadership in Education extended Bloom's Taxonomy to add second dimension related to the relevance of the material. Studies have shown that students understand and retain knowledge best when they have applied it in a practical, relevant setting. A teacher who relies on lecturing does not provide students with optimal learning opportunities. Instead, students go to school to watch the teacher work.



Quadrant A - Acquisition

Students gather and store bits of knowledge and information. Students are primarily expected to remember or understand this knowledge.

Quadrant B - Application

Students use acquired knowledge to solve problems, design solutions, and complete work. The highest level of application is to apply knowledge to new and unpredictable situations.

Quadrant C - Assimilation

Students extend and refine their acquired knowledge to be able to use that knowledge automatically and routinely to analyze and solve problems and create solutions.

Quadrant D - Adaptation

Students have the competence to think in complex ways and to apply their knowledge and skills. Even when confronted with perplexing unknowns, students are able to use extensive knowledge and skill to create solutions and take action that further develops their skills and knowledge.

Level of Intellectual Behavior	Skills	Verbs	Example Questions	Example objective statements
<i>Knowledge</i>	remembering; memorizing; recognizing; recalling identification and recall of information	arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce state	Who, what, when, where, how ...? Describe	know common terms, know specific facts, know methods and procedures, know basic concepts, know principles
<i>Comprehension</i>	interpreting; translating from one medium to another; describing in one's own words; organization and selection of facts and ideas	classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate	Retell...	understand facts and principles, interpret verbal material, interpret charts and graphs, translate verbal material to mathematical eqn., estimate the future consequences implied in data, justify methods and procedures
<i>Application</i>	problem solving; applying information to produce some result; use of facts, rules, principles	apply, choose, demonstrate, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write	How is...an example of...? How is...related to...? Why is...significant?	apply concepts / principles to new situations, apply laws and theories to practical situations, solve mathematical problems, construct graphs and charts, demonstrate a method or procedure
<i>Analysis</i>	subdividing something to show how it is put together; finding the underlying; identifying motives; separation of a whole into component parts	analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test	What are the parts or features of...? Classify...according to... Outline/diagram... How does...compare with...? What is the evidence for...?	recognize unstated assumptions, recognize logical fallacies in reasoning, distinguish between facts and inferences, evaluate the relevancy of data, analyze the organizational structure of a
<i>Synthesis</i>	creating a unique, original product that may be in verbal form or may be a physical object; combination of ideas to form a new whole	arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, write	What would you predict / infer from...? What ideas can you add ...? How would you create / design a new...? What might happen if..? Suggest a solution for...?	write a well organized theme, give a well organized speech propose a plan for an experiment, integrate learning from different areas into a plan for solving a problem, formulates a new scheme for classifying objects (or ideas).

<p><i>Evaluation</i></p>	<p>making value decisions about issues; resolving controversies or differences of opinion; development of opinions, judgments or decisions</p>	<p>appraise, argue, assess, attach, choose compare, defend estimate, judge, predict, rate, core, select, support, value, evaluate</p>	<p>Do you agree...? What is most important...? Place the following in order of priority... How would you decide...? What criteria would you use to assess...?</p>	<p>judge the... logical consistency of written material, adequacy with which conclusions are supported by data, value of a by the use of internal criteria, value of a work by use of external standards of excellence.</p>
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