Bloom's Taxonomy

So what exactly is this thing called Bloom's Taxonomy, and why do education people keep talking about it? Well, Bloom was the head of a group in the 1950's and 1960's that created the classic definition of the levels of educational activity, from the very simple (like memorizing facts) to the more complex (such as analyzing or evaluating information). The three types, or domains, of knowledge they defined are cognitive (knowledge), affective (attitudes) and psychomotor (physical skills). Bloom's committee wrote classification schemes for the first two domains; researchers such as Simpson (1972), Harrow (1972) and Dave (1970) developed competing systems for the psychomotor domain.

When you are creating course objectives, you need to be aware of the level at which you are asking students to perform. Objectives for an introductory course may be appropriately concentrated in the lower levels, while objectives for an upper level course will normally be concentrated in the upper levels. However, since it is our mission not just to convey information to our students but to encourage their critical thinking and reasoning skills, we need to encourage higher order thinking skills from the beginning. Another way to think about this is that we are failing our students if they can pass through to their junior or senior years by relying on memorizing facts. We are setting *them* up for failure in upper level courses or in a profession where analysis and evaluation of information is essential.

So, without further sermonizing, here are the three domains, their complexity levels and examples of educational activities that represent each level:

Cognitive Domain
Cognitive Domain is all about the knowledge base of learners. It is concerned about the brain functions. By learning a student makes relatively permanent change in the brain as a result of which the student shows changed behavior. Knowing some fact, comprehending some theory, using previous knowledge for solving a problem or creating something new are the examples of activities of cognitive domain. The original cognitive domain levels, first made by Bloom himself in 1956, were (1) Knowledge, (2) Comprehension, (3) Application, (4) Analysis, (5) Synthesis and (6) Evaluation. The latest formation of levels, as shown in the figure above, is developed by Professor Bloom's student Lorin Anderson and associate David Krathwohl in 2000. The major change is the use of noun form of action verb for each level and the interchange in level-5 and level-6. The later is well accepted worldwide where Remembering is the lowest and Creating is the highest level of cognitive attainments. Every higher level always contains the previous level expertise.

Cognitive Domain
(Bloom)

Level	Definition	Sample Verbs
Knowledge	Recall and remember information.	defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states, memorizes, tells, repeats, reproduces
Comprehension	Understand the meaning, translation, interpolation, and interpretation of instructions and problems. State a problem in one's own words. Establish relationships between dates, principles, generalizations or values	comprehends, converts, defends, distinguishes, estimates, explains, extends, generalizes, gives examples, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates, shows relationship of, characterizes, associates, differentiates, classifies, compares distinguishes
Application	Use a concept in a new situation or unprompted use of an abstraction. Applies what was learned in the classroom into novel situations in the workplace. Facilitate transfer of knowledge to new or unique situations.	applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, solves, uses, systematizes, experiments, practices, exercises, utilizes, organizes
Analysis	Separates material or concepts into component parts so that its organizational structure may be understood. Distinguishes between facts and inferences.	analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates, investigates, discovers, determines, observes, examines
Synthesis	Builds a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure. Originality and creativity.	categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes, synthesizes, imagines, conceives, concludes, invents theorizes, constructs, creates
Evaluation	Make judgments about the value of ideas or materials.	appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports, calculates, estimates, consults, judges, criticizes, measures, decides, discusses, values, decides, accepts/rejects

Affective Domain

(Bloom)

Level	Definition	Sample Verbs
Receiving phenomena	Awareness, willingness to hear, selected attention.	asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits, erects, replies, uses.
Responding to phenomena	Active participation on the part of the learners. Attends and reacts to a particular phenomenon. Learning outcomes may emphasize compliance in responding, willingness to respond, or satisfaction in responding (motivation).	answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes.
Valuing	The worth or value a person attaches to a particular object, phenomenon, or behavior. This ranges from simple acceptance to the more complex state of commitment.	completes, demonstrates, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works.
Organization	Organizes values into priorities by contrasting different values, resolving conflicts between them, and creating a unique value system. The emphasis is on comparing, relating, and synthesizing values.	adheres, alters, arranges, combines, compares, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes.
Internalizing values	Has a value system that controls their behavior. The behavior is pervasive, consistent, predictable, and most importantly, characteristic of the learner.	acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, verifies.

Affective Domain

Learning with Affective domain gives qualities of feeling and building attitude of learner. For a sustainable society we need to make sure that our graduates are knowledgeable, skilled and having an appropriate attitude at the same time. They need to know what are the chemical reactions in an explosive; they need to have the hands-on skill of making an explosive; and they also must be able to decide when, where and why the explosive can be used. The later learning comes with different levels of Affective Domain. There are five levels in the domain given by Krathwohl, Bloom and Masia in 1973. The earlier version of the same was published in 1964. There are only little and subtle differences between every two consecutive levels in the affective domain.

Psychomotor Domain

(Dave)

Level	Definition	Sample Verbs
Imitation	Includes repeating an act that has been demonstrated or explained, and it includes trial and error until an appropriate response is achieved.	begin, assemble, attempt, carry out, copy, calibrate, construct, dissect, duplicate, follow, mimic, move, practice, proceed, repeat, reproduce, respond, organize, sketch, start
Manipulation	Includes repeating an act that has been demonstrated or explained, and it includes trial and error until an appropriate response is achieved.	(similar to imitation), acquire, assemble, complete, conduct, do, execute, improve, maintain, make, manipulate, operate, pace, perform, produce, progress, use
Precision	Response is complex and performed without hesitation.	achieve, accomplish, advance, exceed, excel, master, reach, refine, succeed, surpass, transcend
Articulation	Skills are so well developed that the individual can modify movement patterns to fit special requirements or to meet a problem situation.	adapt, alter, change, excel, rearrange, reorganize, revise, surpass
Naturalization	Response is automatic. One acts "without thinking."	arrange, combine, compose, construct, create, design, refine, originate, transcend

Psychomotor Domain

Hands-on skill of student is the learning objective in Psychomotor Domain. It is connected to 'do' by which a student shows physical skill of practically doing something learned. The traditional 'motor' skill is extended beyond as a combination of thought. In this article, the levels of Psychomotor Domain shown above are from Dave R. H who was a student of Benjamin Bloom. Dave's 1970 version, another earlier version was published in 1967, is presented here because of its simplicity and easy to understand approach. Other two versions of Psychomotor Domain levels are found from Harrow A. (1972) and Elizabeth Simpson (1972). Simpson's version is quite popular for especially engineering education in which the seven levels are (1) Perception, (2) Set, (3) Guided Response, (4) Mechanism, (5) Complex Overt Response, (6) Adaptation and (7) Origination.

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