Bloom's Taxonomy

INTRODUCTION

A committee of colleges, led by Benjamin Bloom, identified **three domains of educational activities:**

- **Cognitive:** mental skills (Knowledge)
- **Affective:** growth in feelings or emotional areas (Attitude)
- **Psychomotor:** manual or physical skills (Skills)

Domains can be thought of as categories. Trainers often refer to the above domains in a collective sense as "KSAs" (Knowledge, Skills and Attitude). This taxonomy of learning behaviors can be thought of as the expected outcomes of the training process. That is to say after the training session, the learner should have acquired new knowledge, skills and/or attitude.

The Bloom-led committee also produced compilations for the Cognitive and Affective domains. A compilation for the Psychomotor domain was later developed by Elizabeth Simpson and others. Simpson's taxonomy is included in this Annex for reference purposes.

> *Bloom's Taxonomy is an excellent resource for developing learning event outcomes and assessments.*

The Cognitive, Affective and Psychomotor domains are subdivided, starting from the simplest behavior to the most complex. The divisions outlined are not absolutes, and other systems or hierarchies have been devised; Bloom's taxonomy is easily understood, however, and is probably the most widely used today.

The three categories are part of Bloom's taxonomy, a hierarchy that organizes cognitive, affective and psychomotor outcomes starting from the simplest behavior and ranging to the most complex: knowledge, comprehension, application, analysis, synthesis and evaluation (ATD Learning System). See Figure 1, for reference.
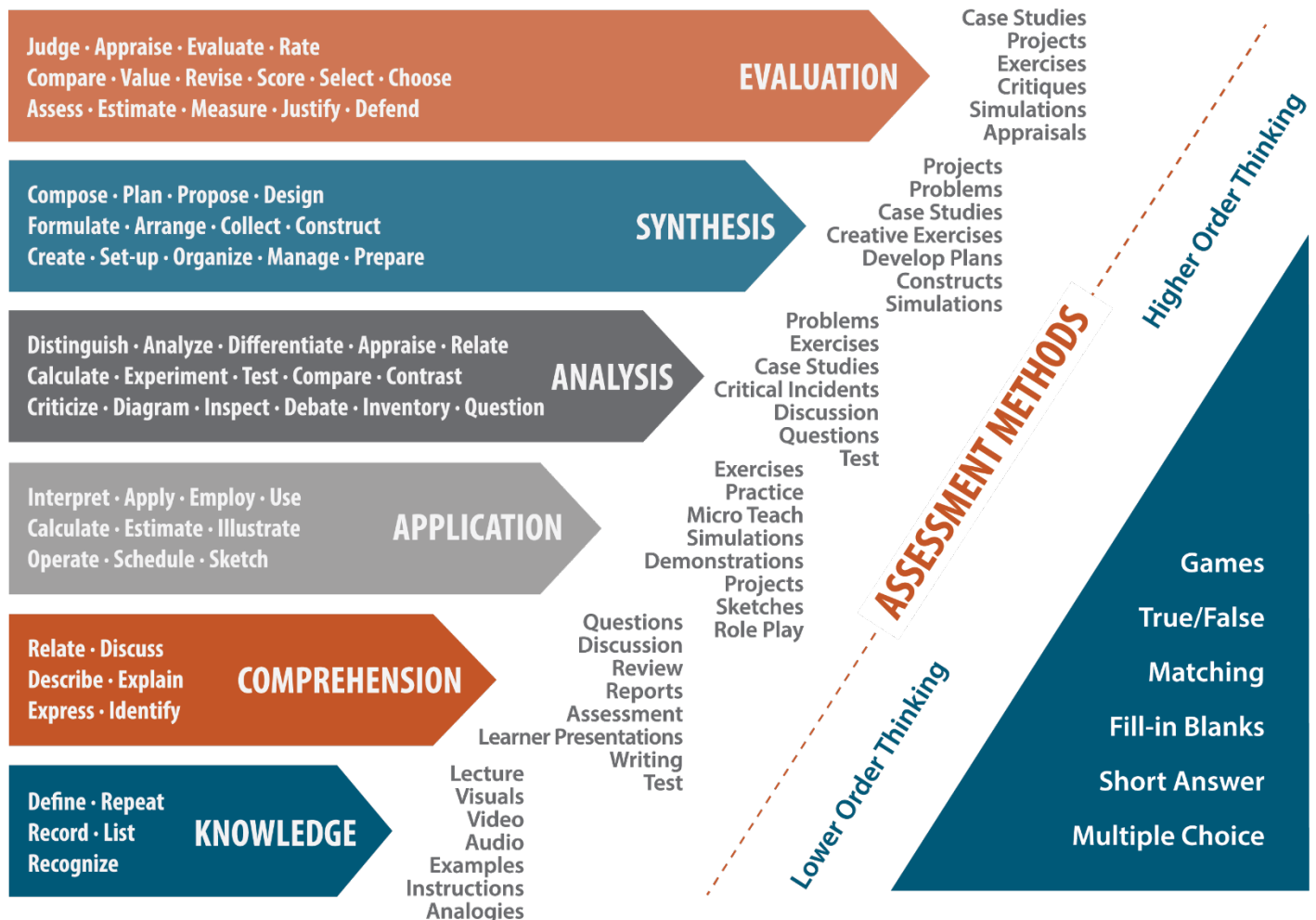
BLOOM'S COGNITIVE LEVELS

FROM BLOOM TO ASSESSMENT

**Judge · Appraise · Evaluate · Rate
Compare · Value · Revise · Score · Select · Choose
Assess · Estimate · Measure · Justify · Defend**

EVALUATION

Case Studies
Projects
Exercises
Critiques
Simulations
Appraisals

**Compose · Plan · Propose · Design
Formulate · Arrange · Collect · Construct
Create · Set-up · Organize · Manage · Prepare**

SYNTHESIS

Projects
Problems
Case Studies
Creative Exercises
Develop Plans
Constructs
Simulations

**Distinguish · Analyze · Differentiate · Appraise · Relate
Calculate · Experiment · Test · Compare · Contrast
Criticize · Diagram · Inspect · Debate · Inventory · Question**

ANALYSIS

Problems
Exercises
Case Studies
Critical Incidents
Discussion
Questions
Test

**Interpret · Apply · Employ · Use
Calculate · Estimate · Illustrate
Operate · Schedule · Sketch**

APPLICATION

Exercises
Practice
Micro Teach
Simulations
Demonstrations
Projects
Sketches
Role Play

**Relate · Discuss
Describe · Explain
Express · Identify**

COMPREHENSION

Questions
Discussion
Review
Reports
Assessment
Learner Presentations
Writing
Test

**Define · Repeat
Record · List
Recognize**

KNOWLEDGE

Lecture
Visuals
Video
Audio
Examples
Instructions
Analogies

Higher Order Thinking

ASSESSMENT METHODS

Lower Order Thinking

Games

True/False

Matching

Fill-in Blanks

Short Answer

Multiple Choice

Figure 1. Bloom's cognitive levels.

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> *Using assessment items designed at a higher level can help improve validity and reliability.*

COGNITIVE DOMAIN

The Cognitive domain involves knowledge and the development of intellectual skills. This includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills. The six major Cognitive domain categories are listed in order herein, starting from the simplest behavior to the most complex. The categories can be thought of as degrees of difficulty—that is, the first one should be mastered before the next one can take place.

Knowledge: Recall data or information.

Examples:
1. Reciting a policy.
2. Quoting prices to a customer from memory.
3. Knowing the safety rules.

Knowledge Level Key Words: defines, describes, identifies, knows, labels, lists, matches, names, outlines, recalls, recognizes, reproduces, selects, states

Comprehension: Understand the meaning, translation, interpolation and interpretation of instructions and problems. State a problem in one's own words.

Examples:
1. Rewriting the principles of test writing.
2. Explaining in one's own words the steps for performing a complex task.
3. Translating an equation into a computer spreadsheet.

Comprehension Level Key Words: comprehends converts, defends, distinguishes, estimates, explains, extends, generalizes, gives examples, infers, interprets, paraphrases, predicts, rewrites, summarizes, translates

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Application: Use a concept in a new situation or unprompted use of an abstraction. Apply what was learned in the classroom into novel situations in the workplace.

   Examples:

   1. Using a manual to calculate an employee's vacation time.
   2. Applying laws of statistics to evaluate the reliability of a written test.

Application Level Key Words: applies, changes, computes, constructs, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses

Analysis: Separate material or concepts into component parts to understand its organizational structure. Distinguish between facts and inferences.

   Examples:

   1. Troubleshooting a piece of equipment by using logical deduction.
   2. Recognizing logical fallacies in reasoning.
   3. Gathering information from a department and selecting the required tasks for training.

Analysis Level Key Words: analyzes, breaks down, compares, contrasts, diagrams, deconstructs, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, relates, selects, separates

Synthesis: Build a structure or pattern from diverse elements. Put parts together to form a whole, with emphasis on creating a new meaning or structure.

   Examples:

   1. Writing a company operations or process manual.
   2. Designing a machine to perform a specific task.
   3. Integrating training from several sources to solve a problem.
   4. Revising a process to improve the outcome.

Synthesis Level Key Words: categorizes, combines, compiles, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes

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Evaluation: Make judgments about the value of ideas or materials.

Examples:
1. Selecting the most effective solution.
2. Hiring the most qualified candidate.
3. Explaining and justifying a new budget.

Evaluation Level Key Words: appraises, compares, concludes, contrasts, criticizes, critiques, defends, describes, discriminates, evaluates, explains, interprets, justifies, relates, summarizes, supports

AFFECTIVE DOMAIN

The Affective domain involves our emotions in the form of feelings, values, appreciation, enthusiasm, motivations and attitudes.

The five major categories of the Affective domain are listed from the simplest behavior to the most complex:

Receiving Phenomena: Be aware and willing to hear.

Examples:
1. Listening to others with respect.
2. Listening for and remembering the name of newly introduced people.

Key Words: asks, chooses, describes, follows, gives, holds, identifies, locates, names, points to, selects, sits, replies, uses

Responding to Phenomena: Actively participate (learners). Attend and react to a particular phenomenon. Learning outcomes may emphasize compliance in responding, willingness to respond or satisfaction in responding (motivation).

Examples:
1. Participating in class discussions.
2. Giving a presentation.
3. Questioning new ideals, concepts and models, in order to fully understand them.
4. Knowing the safety rules and practicing them.

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Key Words: answers, assists, aids, complies, conforms, discusses, greets, helps, labels, performs, practices, presents, reads, recites, reports, selects, tells, writes

Valuing: Understand 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. Valuing is based on the internalization of a set of specified values, while clues to these values are expressed in the learner's overt behavior and are often identifiable.

Examples:
1. Demonstrating a belief in the democratic process.
2. Being sensitive to individual and cultural differences (value diversity).
3. Showing the ability to solve problems.
4. Proposing a plan to social improvement and following through.
5. Informing management on matters about which one feels strongly.

Key Words: completes, demonstrates, differentiates, explains, follows, forms, initiates, invites, joins, justifies, proposes, reads, reports, selects, shares, studies, works

Organization: Organize 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.

Examples:
1. Recognizing the need for balance between freedom and responsible behavior.
2. Accepting responsibility for one's behavior.
3. Explaining the role of systematic planning in solving problems.
4. Accepting professional ethical standards.
5. Creating a life plan in harmony with abilities, interests and beliefs.
6. Prioritizing time effectively to meet the needs of the organization, family and self.

Key Words: adheres, alters, arranges, combines, compares, completes, defends, explains, formulates, generalizes, identifies, integrates, modifies, orders, organizes, prepares, relates, synthesizes

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The Affective domain involves our emotions in the form of feelings, values, appreciation, enthusiasm, motivations and attitudes.

Internalizing values (characterization): Have a value system that controls behavior. The behavior is pervasive, consistent, predictable and, most importantly, characteristic of the learner. Instructional outcomes are concerned with the student's general patterns of adjustment (personal, social, emotional).

> Examples:
> 1. Showing self-reliance when working independently.
> 2. Cooperating in group activities (displaying teamwork).
> 3. Using an objective approach in solving problems.
> 4. Displaying a professional commitment to ethical practice on a daily basis.
> 5. Revising judgments and changing behavior in light of new evidence.
> 6. Valuing people for what they are, not how they look.

Key Words: acts, discriminates, displays, influences, listens, modifies, performs, practices, proposes, qualifies, questions, revises, serves, solves, verifies

PSYCHOMOTER DOMAIN

The Psychomotor domain includes physical movement, coordination and use of the motor-skill areas. Developing these skills requires practice and is measured in terms of speed, precision, distance, procedures or techniques in execution.

The seven major categories of the Psychomotor domain are listed from the simplest behavior to the most complex:

Perception: The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation.

> Examples:
> 1. Detecting non-verbal communication cues.
> 2. Estimating where a ball will land; moving to the correct location to catch the ball.
> 3. Adjusting the heat of a stove to the correct temp. by the smell and taste of food.

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4.   Adjusting the height of forks on a forklift by comparing where the forks are in relation to the pallet.

Key Words: chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects

Set: Be ready to act. Includes mental, physical and emotional sets, which are dispositions that predetermine a person's response to different situations (sometimes called "mindsets").

NOTE: This subdivision is closely related to the "Responding to Phenomena" subdivision of the Affective domain.

Examples:

1.   Knowing and acting upon a sequence of steps in a manufacturing process.
2.   Recognizing one's abilities and limitations.
3.   Showing a desire to learn a new process (motivation).

Key Words: begins, displays, explains, moves, proceeds, reacts, shows, states, volunteers

Guided Response: The early stages of learning a complex skill, involving imitation as well as trial and error. Adequacy of performance is achieved through practice.

Examples:

1.   Performing a mathematical equation as demonstrated.
2.   Following instructions to build a model.
3.   Responding to the hand signals of an instructor while learning to operate a forklift.

Key Words: copies, follows, reacts, reproduces, responds, traces

Mechanism: Serves as the intermediate stage of learning a complex skill. Learned responses have become habitual, and movements can be performed with some confidence and proficiency.

Examples:

1.   Using a personal computer.
2.   Repairing a leaking faucet.
3.   Driving a car.

Key Words: assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches

Complex Overt Response: Is the skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation and automatic performance.

> Examples:
> 1. Maneuvering a car into a tight space.
> 2. Operating a computer quickly and accurately.
> 3. Displaying competence while playing the piano.

Key Words: assembles, builds, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches

NOTE: The key words are the same as for mechanism but will use adverbs or adjectives indicating the performance is quicker, better, more accurate, etc.

Adaptation: Are well-developed skills, and the individual can modify movement patterns to fit special requirements.

> Examples:
> 1. Responding effectively to unexpected experiences.
> 2. Modifying instructions to meet the needs of learners.
> 3. Performing a task with a machine that it was not originally intended to do (machine is not damaged and there is no danger in performing the new task).

Key Words: adapts, alters, changes, rearranges, reorganizes, revises, varies

Origination: Creating new movement patterns to fit a specific situation or problem. Learning outcomes emphasize creativity on the basis of highly developed skills.

> Examples:

1. Constructing a new theory.
2. Developing a new and comprehensive training program.
3. Creating a new gymnastic routine.

Key Words: arranges, builds, combines, composes, constructs, creates, designs, initiates, makes, originates

REVISED BLOOM'S TAXONOMY

In the 1990s, a student of Bloom's, Lorin Anderson, revised the original taxonomy. As noted in Figure 2, in the amended version of Bloom's Taxonomy, the names of the major cognitive process categories were changed to indicate action because thinking implies active engagements. Instead of listing knowledge as a part of the taxonomy, the category is divided into different types of knowledge: factual, conceptual, procedural and metacognitive. This newer taxonomy also moves the evaluation stage down a level and the highest element becomes "creating."
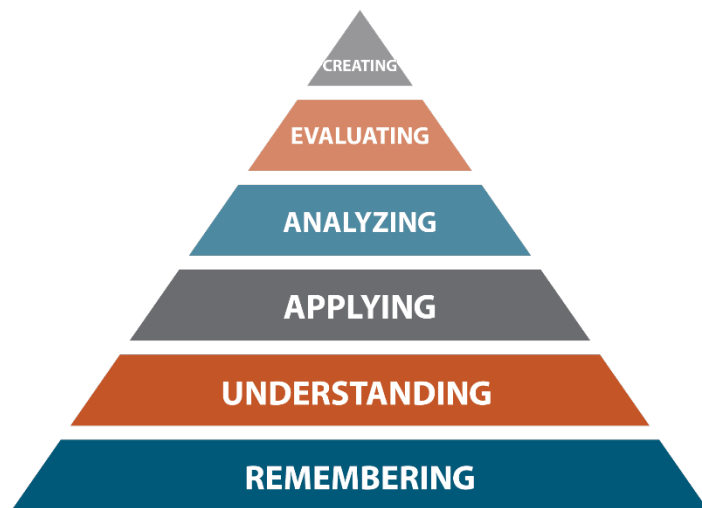

Figure 2. Revised Bloom's Taxonomy

The revised taxonomy arranges skills from most basic to most complex. The new version has two dimensions—knowledge and cognitive processes—and the subcategories within each dimension are more extensive and specific.

The report explains how the two-dimensional taxonomy is used to build performance-based objectives. You will want to read this part because it will help you build much more targeted objectives. In 2007, Andrew Churches updated Bloom's work again by introducing Bloom's Digital Taxonomy.

Churchs' intent was to marry Bloom's cognitive levels to 21st-century digital skills.

For example, for the top of the revised taxonomy, creating, learners might—

1. Develop a script for a video.
2. Construct an eBook
3. Develop a podcast

A useful infographic explaining the Bloom's Digital Taxonomy can be found at:

- https://globaldigitalcitizen.org/blooms-digital-taxonomy-verbs

Other Learning Taxonomy Resources

- Webb's Depth of Knowledge (DOK)
  http://www.aps.edu/re/documents/resources/Webbs_DOK_Guide.pdf

- Structure of Observed Learning Outcome (SOLO) Taxonomy
  http://www.uq.edu.au/teach/assessment/docs/biggs-SOLO.pdf