Dr Manu Chadha

Mail id- manumehar@gmail.com

BLOOM'S TAXONOMY

In 1956, Benjamin Bloom with collaborators Max Englehart, Edward Furst, Walter Hill, and David Krathwohl published a framework for categorizing educational goals: *Taxonomy of Educational Objectives*. Familiarly known as Bloom's Taxonomy.

The framework elaborated by Bloom and his collaborators consisted of six major categories: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation. The categories after Knowledge were presented as "skills and abilities," with the understanding that knowledge was the necessary precondition for putting these skills and abilities into practice.

The Original Taxonomy (1956)

The main categories of Cognitive Domain of *Taxonomy of Educational Objectives* :

- **Knowledge** "involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting."
- **Comprehension** "refers to a type of understanding or apprehension such that the individual knows what is being communicated and can make use of the material or idea being communicated without necessarily relating it to other material or seeing its fullest implications."
- **Application** refers to the "use of abstractions in particular and concrete situations."
- **Analysis** represents the "breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between ideas expressed are made explicit."
- **Synthesis** involves the "putting together of elements and parts so as to form a whole."
- **Evaluation** engenders "judgments about the value of material and methods for given purposes."

THE COGNITIVE DOMAIN

In the 1956 original version of the taxonomy, the cognitive domain is broken into the six levels of objectives listed below.

In the 2001 revised edition of Bloom's taxonomy, the levels have slightly different names and the order is revised: Remember, Understand, Apply, Analyze, Evaluate, and Create (rather than Synthesize).

Knowledge

Knowledge involves recognizing or remembering facts, terms, basic concepts, or answers without necessarily understanding what they mean. Its characteristics may include:

- Knowledge of specifics—terminology, specific facts
- Knowledge of ways and means of dealing with specifics—conventions, trends and sequences, classifications and categories
- Knowledge of the universals and abstractions in a field—principles and generalizations, theories and structures

***Example*:** Name three common varieties of apple.

Comprehension

Comprehension involves demonstrating an understanding of facts and ideas by organizing, summarizing, translating, generalizing, giving descriptions, and stating the main ideas.

***Example*:** Summarize the identifying characteristics of a Golden Delicious apple and a Granny Smith apple.

Application

Application involves using acquired knowledge—solving problems in new situations by applying acquired knowledge, facts, techniques and rules. Learners should be able to use prior knowledge to solve problems, identify connections and relationships and how they apply in new situations.

***Example*:** Would apples prevent scurvy, a disease caused by a deficiency in vitamin C?

Analysis

Analysis involves examining and breaking information into component parts, determining how the parts relate to one another, identifying motives or causes, making inferences, and finding evidence to support generalizations. Its characteristics include:

- Analysis of elements
- Analysis of relationships
- Analysis of organization

***Example*:** Compare and contrast four ways of serving foods made with apples and examine which ones have the highest health benefits.

Synthesis

Synthesis involves building a structure or pattern from diverse elements; it also refers to the act of putting parts together to form a whole. Its characteristics include:

- Production of a unique communication
- Production of a plan, or proposed set of operations
- Derivation of a set of abstract relations

***Example*:** Convert an "unhealthy" recipe for apple pie to a "healthy" recipe by replacing your choice of ingredients. Argue for the health benefits of using the ingredients you chose versus the original ones.

Evaluation

Evaluation involves presenting and defending opinions by making judgments about information, the validity of ideas, or quality of work based on a set of criteria. Its characteristics include:

- Judgments in terms of internal evidence
- Judgments in terms of external criteria

***Example*:** Which kinds of apples are best for baking a pie, and why?

THE AFFECTIVE DOMAIN (EMOTION-BASED)

Skills in the affective domain describe the way people react emotionally and their ability to feel other living things' pain or joy. Affective objectives typically target the awareness and growth in attitudes, emotion, and feelings.

There are five levels in the affective domain moving through the lowest-order processes to the highest.

Receiving

The lowest level; the student passively pays attention. Without this level, no learning can occur. Receiving is about the student's memory and recognition as well.

Responding

The student actively participates in the learning process, not only attends to a stimulus; the student also reacts in some way.

Valuing

The student attaches a value to an object, phenomenon, or piece of information. The student associates a value or some values to the knowledge they acquired.

Organizing

The student can put together different values, information, and ideas, and can accommodate them within his/her own schema; the student is comparing, relating and elaborating on what has been learned.

Characterizing

The student at this level tries to build abstract knowledge.

THE PSYCHOMOTOR DOMAIN (ACTION-BASED)

Skills in the psychomotor domain describe the ability to physically manipulate a tool or instrument like a hand or a hammer. Psychomotor objectives usually focus on change and/or development in behavior and/or skills.

Bloom and his colleagues never created subcategories for skills in the psychomotor domain, but since then other educators have created their own psychomotor taxonomies. Simpson (1972) proposed the following levels:

Perception

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

***Examples*:** Detects non-verbal communication cues. Estimate where a ball will land after it is thrown and then moving to the correct location to catch the ball. Adjusts heat of the stove to correct temperature by smell and taste of food. Adjusts the height of the 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

Readiness to act: It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations (sometimes called mindsets). This subdivision of psychomotor is closely related with the "responding to phenomena" subdivision of the affective domain.

***Examples*:** Knows and acts upon a sequence of steps in a manufacturing process. Recognizes his or her abilities and limitations. Shows desire to learn a new process (motivation).

***Keywords*:** begins, displays, explains, moves, proceeds, reacts, shows, states, volunteers.

Guided response

The early stages of learning a complex skill that includes imitation and trial and error: Adequacy of performance is achieved by practicing.

***Examples*:** Performs a mathematical equation as demonstrated. Follows instructions to build a model. Responds to hand-signals of the instructor while learning to operate a forklift.

Keywords: copies, traces, follows, reacts, reproduces, responds.

Mechanism

The intermediate stage in learning a complex skill: Learned responses have become habitual and the movements can be performed with some confidence and proficiency.

***Examples*:** Use a personal computer. Repair a leaking tap. Drive a car.

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

Complex overt response

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. For example, players will often utter sounds of satisfaction or expletives as soon as they hit a tennis ball or throw a football because they can tell by the feel of the act what the result will produce.

***Examples*:** Maneuvers a car into a tight parallel parking spot. Operates a computer quickly and accurately. Displays 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 in mechanism, but will have adverbs or adjectives that indicate that the performance is quicker, better, more accurate, etc.)

Adaptation

Skills are well developed and the individual can modify movement patterns to fit special requirements.

***Examples*:** Responds effectively to unexpected experiences. Modifies instruction to meet the needs of the learners. Performs a task with a machine that was not originally intended for that purpose (the 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 particular situation or specific problem: Learning outcomes emphasize creativity based upon highly developed skills.

***Examples*:** Constructs a new set or pattern of movements organized around a novel concept or theory. Develops a new and comprehensive training program. Creates a new gymnastic routine.

***Key words*:** arranges, builds, combines, composes, constructs, creates, designs, initiates, makes, originates.

CRITICISM OF THE TAXONOMY

As Morshead (1965) pointed out on the publication of the second volume, the classification was not a properly constructed taxonomy, as it lacked a systematic rationale of construction.

This was subsequently acknowledged in the discussion of the original taxonomy in its 2001 revision, and the taxonomy was reestablished on more systematic lines.

Some critiques of the taxonomy's cognitive domain admit the existence of these six categories but question the existence of a sequential, hierarchical link.

Often, educators view the taxonomy as a hierarchy and may mistakenly dismiss the lowest levels as unworthy of teaching.

The learning of the lower levels enables the building of skills in the higher levels of the taxonomy, and in some fields, the most important skills are in the lower levels (such as identification of species of plants and animals in the field of natural history), Instructional scaffolding of higher-level skills from lower-level skills is an application of Vygotskian constructivism.

Some consider the three lowest levels as hierarchically ordered, but the three higher levels as parallel.

Others say that it is sometimes better to move to application before introducing concepts the goal being to create a problem-based learning environment where the real world context comes first and the theory second, to promote the student's grasp of the phenomenon, concept, or event.

The distinction between the categories can be seen as artificial since any given cognitive task may entail a number of processes. It could even be argued that any attempt to nicely categorize cognitive processes into clean, cut-and-dried classifications undermines the holistic, highly connective and interrelated nature of cognition.

This is a criticism that can be directed at taxonomies of mental processes in general.

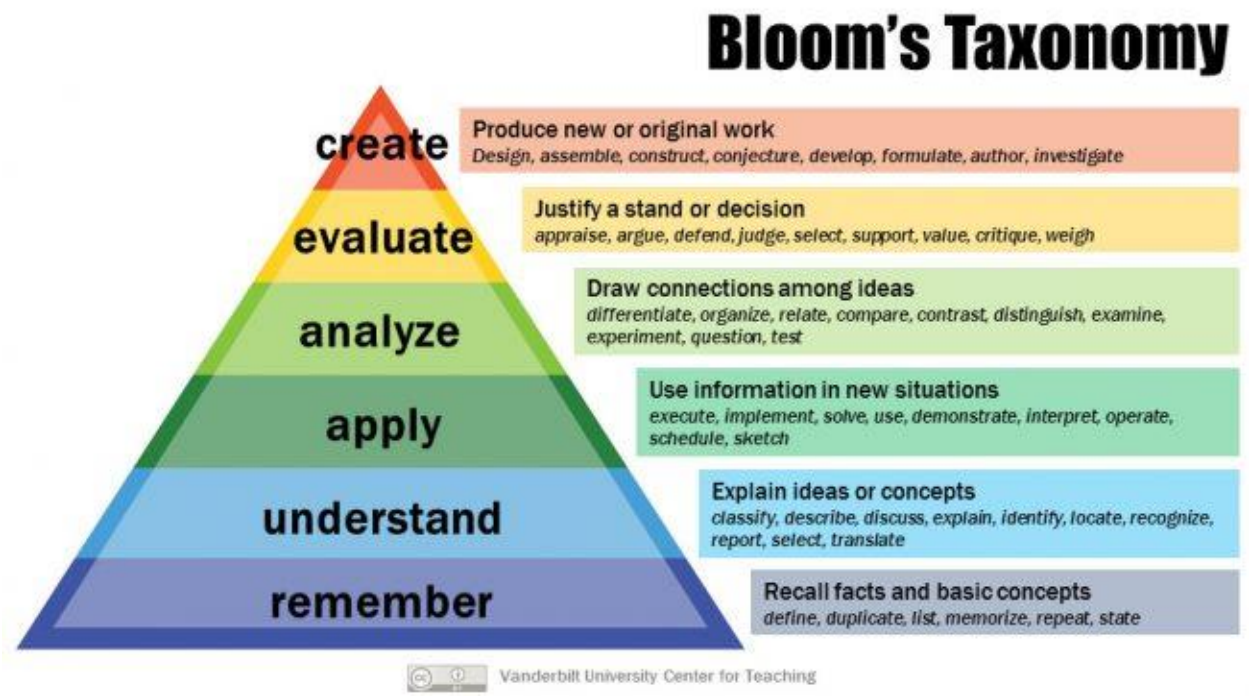
The taxonomy is widely implemented as a hierarchy of verbs, designed to be used when writing learning outcomes, but a 2020 analysis showed that these verb lists showed no consistency between educational institutions, and thus learning outcomes that were mapped to one level of the hierarchy at one educational institution could be mapped to different levels at another institution.

Implications- Bloom's taxonomy serves as the backbone of many teaching philosophies, in particular, those that lean more towards skills rather than content. These educators view content as a vessel for teaching skills. The emphasis on higher-order thinking inherent in such philosophies is based on the top levels of the taxonomy including application, analysis, synthesis, and evaluation. Bloom's taxonomy can be used as a teaching tool to help balance evaluative and assessment-based questions in assignments, texts, and in-class engagements to ensure that all orders of thinking are exercised in students' learning, including aspects of information searching.

Connections across disciplines

Bloom's taxonomy (and the revised taxonomy) continues to be a source of inspiration for educational philosophy and for developing new teaching strategies. The skill development that takes place at higher orders of thinking interacts well with a developing global focus on multiple literacies and modalities in learning and the emerging field of integrated disciplines. The ability interface with and create media would draw upon skills from both higher order thinking skills (analysis, creation, and evaluation) and lower order thinking skills (knowledge, comprehension, and application)

REVISED BLOOM’S TAXONOMY



The Revised Taxonomy (2001)

The authors of the revised taxonomy underscore this dynamism, using verbs and gerunds to label their categories and subcategories (rather than the nouns of the original taxonomy). These "action words" describe the cognitive processes by which thinkers encounter and work with knowledge:

- Remember
    - Recognizing
    - Recalling
- Understand
    - Interpreting
    - Exemplifying
    - Classifying
    - Summarizing
    - Inferring
    - Comparing
    - Explaining

- Apply
    - Executing
    - Implementing
- Analyze
    - Differentiating
    - Organizing
    - Attributing
- Evaluate
    - Checking
    - Critiquing
- Create
    - Generating
    - Planning
    - Producing

In the revised taxonomy, knowledge is at the basis of these six cognitive processes, but its authors created a separate taxonomy of the types of knowledge used in cognition:

- **Factual Knowledge**
    - Knowledge of terminology
    - Knowledge of specific details and elements
- **Conceptual Knowledge**
    - Knowledge of classifications and categories
    - Knowledge of principles and generalizations
    - Knowledge of theories, models, and structures
- **Procedural Knowledge**
    - Knowledge of subject-specific skills and algorithms
    - Knowledge of subject-specific techniques and methods
    - Knowledge of criteria for determining when to use appropriate procedures
- **Metacognitive Knowledge**
    - Strategic Knowledge

- Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge
- Self-knowledge