**Bloom's Taxonomy and Higher Order Thinking**

In the 1950's Benjamin Bloom developed his taxonomy (classification) of cognitive objectives called Bloom's Taxonomy. This categorized and ordered thinking skills. His taxonomy follows the thinking process. You can not understand a concept if you do not first remember it, similarly you can not apply knowledge and concepts if you do not understand them. It is a continuum from Lower Order Thinking Skills (LOTS) to Higher Order Thinking Skills (HOTS).

**Bloom's Taxonomy 1950’s**



* **Knowledge:** Remembering, memorizing recognizing recalling identification recalling information: who, what, when, where, how, describe
* **Comprehension:** Interpreting, translating from one medium to another, describing in one's own words, organization and selection of facts and ideas, retell...
* **Application:** Problem solving, applying information to produce some result, use of facts, rules and principles
* **Analysis:** Subdividing something to show how it is put together, finding the underlying structure of a communication, identifying motives, separation of a whole into component parts, parts or features, classify, outline/diagram, compare/contrast, evidence
* **Synthesis:** 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, predict/infer, add to, create/design, combine, solutions
* **Evaluation:** Making value decisions about issues, resolving controversies or differences of opinion, development of opinions, judgements or decisions

In the 1990's, a former student of Bloom, Lorin Anderson, revised Bloom's Taxonomy and published this- Bloom's Revised Taxonomy in 2001. Key to this is the use of verbs rather than nouns for each of the categories and a rearrangement of the sequence within the taxonomy. They are arranged in increasing order, from low to high.

 **Bloom's Revised Taxonomy 1990’s** The new terms (verbs) are defined as:

* **Remembering**: Retrieving, recognizing, and recalling relevant knowledge from long-term memory.
* **Understanding**: Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
* **Applying**: Carrying out or using a procedure through executing, or implementing.
* **Analyzing**: Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.
* **Evaluating**: Making judgments based on criteria and standards through checking and critiquing.
* **Creating**: Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.

 (Anderson & Krathwohl, 2001, pp. 67-68)

Higher-order thinking essentially means thinking that takes place in the higher-levels of the hierarchy of cognitive processing. A common example is shown below, applying the taxonomy to the Pledge of Allegiance:

**Knowledge** statements ask the student to recite the pledge. Example: “Say the pledge.”

**Comprehension** statements ask the student to explain the meaning of words contained in the pledge. Example: “Explain what indivisible, liberty, and justice mean.”

**Application** statements ask the student to apply understandings. Example: “Create your own pledge to something you believe in.”

**Analysis** statements ask the student to interpret word meanings in relation to context. Example: “Discuss the meaning of ‘and to the Republic for which it stands’ in terms of its importance to the pledge.”

**Synthesis** statements ask the student to apply concepts in a new setting. Example: “Write a contract between yourself and a friend that includes an allegiance to a symbol that stands for something you both believe in.”

**Evaluation** statements ask the student to judge the relative merits of the content and concepts contained in the subject. Example: “Describe the purpose of the pledge and assess how well it achieves that purpose. Suggest improvements.”

(Wiederhold, C. (1997). *The Q-Matrix/Cooperative Learning & Higher-Level Thinking.* San Clemente, CA: Kagan Cooperative Learning.)

# Questioning for Quality Thinking at Each Level of Bloom’s Taxonomy

**Knowledge:** Identification and recall of information

Who, what, when, where, how? Describe \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Comprehension:** Organization and selection of facts and ideas.

Retell \_\_\_\_\_\_\_\_\_\_\_ in your own words. What is the main idea of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

**Application:** Use of facts, rules, principles

How is \_\_\_\_\_\_\_\_\_\_ and example of \_\_\_\_\_\_\_\_\_\_? How is \_\_\_\_\_\_\_\_\_\_ related to \_\_\_\_\_\_\_\_? Why is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ significant?

**Analysis:** Separation of the whole into component parts

What are the parts or features of \_\_\_\_\_\_\_\_? Classify \_\_\_\_\_\_\_ according to \_\_\_\_\_\_\_\_\_\_\_.

Outline/diagram/web \_\_\_\_\_\_. How does \_\_\_\_\_\_\_\_\_\_ compare/contrast with \_\_\_\_\_\_\_\_\_\_\_? What evidence can you list for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

**Synthesis:** Combination of ideas to form a new whole

What would you predict/infer from \_\_\_\_\_\_\_\_\_\_\_? What ideas can you add to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_? How would you create/design a new \_\_\_\_\_\_\_\_\_\_? What might happen if you combine \_\_\_\_\_\_\_\_\_\_\_ with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_? What solutions would you suggest for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

**Evaluation:** Development of opinions, judgments, or decisions

Do you agree with \_\_\_\_\_\_\_\_\_\_\_? What do you think about \_\_\_\_\_\_\_\_\_\_? What is the most important \_\_\_\_\_\_\_\_\_\_\_\_\_? Prioritize \_\_\_\_\_\_\_\_\_\_\_\_. How would you decide about \_\_\_\_\_\_\_\_\_\_\_\_\_? What criteria would you use to assess \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?