Benjamin Bloom’s Taxonomy of Educational Objectives (Bloom, 1956) classifies educational goals, objectives, and standards. The framework was originally conceived as a way to allow pedagogical interchange of test question banks (typically multiple-choice items) that measured the same educational objectives (Krathwohl, 2002). Six categories (see Figure 1) frame a cumulative hierarchy so that achievement of the more complex skills or abilities requires the prerequisite achievement of the prior one(s).

Multiple-choice test items on the Virginia Standards of Learning Tests most often assess students’ recognition or recall of information (Knowledge category) and the understanding of that knowledge (Comprehension category). Math and science SOL tests have a greater percentage of questions that require the use of Application and Analysis. For example, solving an algebraic equation (execution) or determining which scientific law is applied to a novel situation (implementation) are both problems requiring Application.

While Bloom’s Taxonomy has six levels, the nature of levels five and six (Synthesis and Evaluation) are difficult to test using multiple-choice questions (Mulligan, 2002).

Interactive Achievement designates a Bloom’s Taxonomy level to each question in its item bank to provide educators with information regarding the complexity and abstraction of test items. This enables teachers to select items based on the type of cognitive processes they expect students to use when responding to a question. When applicable, Interactive Achievement strives to provide test items that measure a range of simple to complex and concrete to abstract cognitive processes.

It is important to note that the authors of Bloom’s Taxonomy, and the Revised Taxonomy, caution that not all test questions have a clear-cut Taxonomy level designation (Anderson, 2001; Bloom 1956). Additionally, a question may fall into two categories. When assigning Bloom’s Taxonomy levels, assumptions are made about students’ prior knowledge, as their experiences affect the cognitive processes required to answer questions. For example, a student may encounter a test item intended to assess a higher-order cognitive process, but has been presented beforehand. In this instance, the student need only remember (Knowledge category) the prior experience.

The chart below provides information about Bloom’s Taxonomy levels. Sample questions written by Bloom and authors of the revised Taxonomy are included.
<table>
<thead>
<tr>
<th>Taxonomy Category and Description</th>
<th>Samples From Anderson, 2001 unless otherwise noted</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Knowledge</strong></td>
<td><strong>student is asked to</strong></td>
</tr>
<tr>
<td></td>
<td>• Identify ordinal positions</td>
</tr>
</tbody>
</table>
|                                  | • Identify fractions from a pictorial represen-
|                                  | tation                                   |
|                                  | • Recall basic math facts                   |
|                                  | • Identify a property (commutative, additive, etc) |
|                                  | • State the formula for the area of a circle |
|                                  | • Recall locations of a historical events   |
|                                  | • Know the structure or functions of Congress|
|                                  | • Know the representational symbols on maps and charts |
|                                  | • Know major facts about particular cultures and societies |
|                                  | • Know major products and exports of countries|
|                                  | • Identify a phrase as a simile             |
|                                  | • Identify which word begins with the same sound as the s in sun (Knowledge of letter s) |
|                                  | • Know how to find a word in a dictionary   |
| Knowledge of...                 | From Bloom, 1956                             |
| Facts (bits of information)     | • Which number does not belong in the set of whole numbers? |
|                                  | • Which of the following is the method for determining the volume of a cylinder? |
|                                  | • About what proportion of the population of the US is living on farms? |
|                                  | • Look at the symbol. What is the symbol’s purpose on a map? |
|                                  | • Which has been a result of this country’s policy of maintaining a high protective tariff? |
| Terminology                     |                                               |
| Specific details and elements   |                                               |
| Classifications and categories  |                                               |
| Concepts (organized knowledge forms) |                                               |
| Principles and generalizations  |                                               |
| Theories, models, structures    |                                               |
| Procedures (how to do something)|                                               |
| Subject-specific skills         |                                               |
| Subject-specific techniques and methods |                                               |
| Criteria for determining when to use appropriate procedures |   |
| Which strategy should be used   |                                               |
### 2. Comprehension

**The student will understand...**

**Constructing the meaning of a communication**
- **Interpret**, including reordering the ideas into a new configuration; changing from one form to another (Paraphrasing)
- **Exemplify** (Give new, not yet encountered, example of a general concept or principle)
- **Classify** (Detect relevant features or patterns that fit the instance and concept or principle)- opposite of exemplifying
- **Translation/Summarization**, including identification of the literal structure underlying the incoming information; abstract a theme; single statement representing presented information
- **Extrapolate, including inferring** (finding a pattern when given a series of examples or instances, then noting relationships between them; making a comparison among instances) and Predicting based on literal information- this goes beyond literal levels of comprehension. Includes completion tasks (what comes next), analogies, and oddity tasks (which does not belong)
- **Compare/Match** (Detect similarities and differences between two or more objects, events, ideas, problems or situations; finding a one-to-one correspondence; reasoning by analogy)
- **Explain/Reason** (Construct and use a cause-and-effect model of a system; determine how one event or change affects another)
- Build connections between old and new knowledge

**Comprehension**

is the largest class of intellectual skills (Marzano, 2007).

A student is asked to
- Determine the next number in a sequence
- Tell time to the nearest five minutes
- Explain the process (paraphrase) for finding the perimeter of a rectangular garden
- Paraphrase an important speech
- Summarize a historical document
- Compare historical events to contemporary situations
- Explain the causes of historical events
- Draw a diagram or pictorial representation of story
- Select the best title for a passage
- Determine the author’s point of view
- Predict what will happen next.
- Complete an analogy (analogy tasks are inference tasks)

From Bloom, 1956
- Based on the information in the graph, which of the following is true? (Includes 4 statements about the information in the graph)

### 3. Application

**The student will apply...**

Use a problem solving process (procedure) in a given situation to perform exercises or solve problems
- **Execute** (Use a pattern to create a new instance; task is a familiar exercise; student knows what procedure to use)
- **Implement** (When a task is an unfamiliar problem; student must first determine what procedure to use)
- Closely linked to procedural knowledge

Application is the least well-defined category (Marzano, 2007).

**Application**

- Student must identify the procedure to be used and then perform the task
- Situation or elements of the situation must be new to the student

A student is asked to
- Solve a math problem using familiar procedure or formula
- Compute the volume of a cylinder
- Participate in a mock election
- Apply the rule of law to a new situation

**Did you know?**

Bloom’s use of the term application differs from our normal conversational use of the term? Simply using information does not guarantee an application-level cognitive process.
**Analysis**

"The student will analyze..."

Breaking down into constituent parts and determining how parts relate to each other and the whole; involves structural analysis

- **Differentiate/Distinguish/Discriminate** (Separate parts of a whole in terms of their relevance or structure)
- **Organize** (Using the structures contained within; identify the elements and recognize how they fit together into a structure; build systematic connections; impose structure on material; occurs in conjunction with differentiating)
- **Attribute** (Involves a process of deconstruction and inference)
- Considered an *extension of comprehension* and prelude to evaluation and synthesis

A student is asked to

- Read a word problem and determine the strategies that would be necessary to solve it
- Structure evidence in a historical description into evidence for and against a particular historical explanation
- Determine which organizational pattern is used
- Find irrelevant information in a story
- Choose the sentence that best supports the author’s purpose
- Outline the major ideas in a passage
- Divide the story into initiating event, rising action, climax, and falling action

From Bloom, 1956

- Recognize the unstated assumption
- Distinguish facts from hypotheses
- Identify motives for how a problem is solved

**Synthesis**

"The student will synthesize..."

Putting elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure; creativity is used

**Generate**

- Hypothesize to account for something

**Plan**

- Plan a research paper

**Produce**

- Using all that was learned to build something novel

A student is asked to

- Apply and integrate several different strategies to solve a mathematical problem (not according to one formula)
- Plan a research paper on a given historical topic

From Bloom, 1956

A student is asked to

- Design a building according to given specifications

**Evaluation**

"The student will evaluate..."

Make judgments based on criteria and standards

**Check**

- Determine if someone’s conclusions are logical
- Critique
- Judging which method is best to use to solve a problem

A student is asked to

- Decide which method of solving a problem was most effective
- After solving a problem, determine the degree to which the problem was solved as efficiently as possible
- Decide which course of action was most effective
- Determine if a character’s actions were heroic

From Bloom, 1956

- Which of the following actions would probably be least effective in determining the answer?

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**Bibliography**


