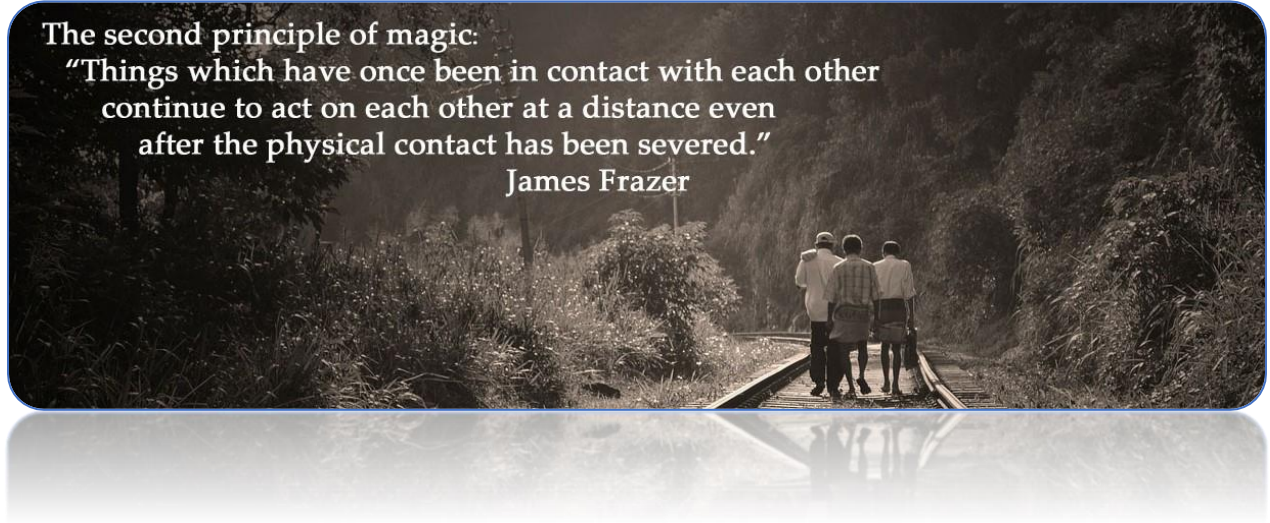


# The Second Principle

The work of Leslie Owen Wilson, Ed. D.

The second principle of magic:  
"Things which have once been in contact with each other  
continue to act on each other at a distance even  
after the physical contact has been severed."  
James Frazer



## Bloom's Taxonomy Revised

### Understanding the Revised Version of Bloom's Taxonomy

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#### Contact Leslie

A succinct discussion of the revisions to Bloom's classic cognitive taxonomy by Anderson and Krathwohl and how to use them effectively

#### Background:

**Who are Anderson and Krathwohl?** These gentlemen are the primary authors of the revisions to what had become known as ***Bloom's Taxonomy*** — an ordering of cognitive skills. (**A taxonomy is really just a word for a form of classification.**) This taxonomy had permeated teaching and instructional planning for almost 50 years before it was revised in 2001. And although these crucial revisions were published in 2001, surprisingly there are still educators who have never heard of Anderson and Krathwohl or their important work in relation to Bloom's Cognitive Taxonomy. Both of these primary authors were in a perfect position to orchestrate looking at the classic taxonomy through a critical lens. Lorin Anderson was once a student of the famed Benjamin Bloom, and David Krathwohl was one of Bloom's partners as he devised his 1956 classic cognitive taxonomy. They called together a group of educational psychologists and educators to help them with the revisions. Their combined efforts led to a revised version of Bloom's famed taxonomy.

Here in the United States, from the late 1950s into the early 1970s, there were attempts to dissect and classify the varied domains of human learning – cognitive (knowing, or head), affective (emotions, feelings, or heart) and psychomotor (doing, or kinesthetic, tactile, haptic or hand/body). The resulting efforts yielded a series of taxonomies for each area. The

aforementioned taxonomies deal with the varied aspects of human learning and were arranged hierarchically, proceeding from the simplest functions to those that are more complex. *Bloom's Cognitive Taxonomy* had been a foundational staple in teacher training and professional preparation for almost 40 years before Anderson and Krathwohl instituted an updated version. An overview of those changes appears below.

While all of the taxonomies above have been defined and used for many years, there came about at the beginning of the 21st century in a new version of the **cognitive** taxonomy, known commonly before as *Bloom's Taxonomy*. You can also search the Web for varied references on the other two taxonomies — affective or psychomotor. There are many valuable discussions on the development of all the of these hierarchies, as well as examples of their usefulness and applications in teaching. However, it is important to note that in a number of these discussions, **some web authors have mislabeled the affective and psychomotor domains as extensions of Bloom's work**. These authors are in grave error!

The original cognitive domain was described and published in 1956. This work was written by Benjamin Bloom, Max Englehart, Edward Furst, Walter Hill, and David Krathwohl. As Bloom was the senior and primary author, his name was listed first on the publication. Thus, this seminal work became commonly known as *Bloom's Taxonomy*.

The affective domain was not categorized until 1964 and as David Krathwohl was the lead author on this endeavor, it should bear his name, not Bloom's. Bloom had little to do with the psychomotor domain and it was not described or named until the first part of the 1970s. There are 3 versions of this taxonomy by 3 different authors — Harrow (1972); Simpson (1972); and Dave (1970) See full citations below.

### The Cognitive Domain:

The following chart includes the two primary existing **taxonomies of cognition**. Please note in the column one on the left, entitled **Bloom's**, is based on the original work of Benjamin Bloom and others as they attempted in 1956 to define the **functions of thought, coming to know, or cognition**. Many teachers loved this 1956 version because they could go into the chart and just pick and choose which verbs they wanted students to perform. But this rendition of the cognitive taxonomy is well over 60 years old, and we now know a lot more about the processes involved in human cognition.

The taxonomy in the right hand column is the more recent adaptation and is the redefined work of Bloom in 2000-01. That one is labeled **Anderson and Krathwohl**. The group redefining Bloom's original concepts, worked from 1995-2000. As indicated above, this group was assembled by Lorin Anderson and David Krathwohl and included people with expertise in the areas of cognitive psychology, curriculum and instruction, and educational testing, measurement, and assessment. **I think it is important to note the new adaptation also took into consideration many of Bloom's own concerns and criticisms of his original taxonomy.**

Bloom's Taxonomy 1956	Anderson and Krathwohl's Revised Taxonomy 2001																					
<p><b>1. Knowledge: Remembering or retrieving previously learned material. Examples of verbs that relate to this function are:</b></p> <table><tr><td>know</td><td>define</td><td>record</td></tr><tr><td>identify</td><td>recall</td><td>name</td></tr><tr><td>relate</td><td>memorize</td><td>recognize</td></tr><tr><td>list</td><td>repeat</td><td>acquire</td></tr></table>	know	define	record	identify	recall	name	relate	memorize	recognize	list	repeat	acquire	<p><b><u>1. Remembering:</u></b></p> <p>Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce or retrieve definitions, facts, or lists, or to recite previously learned information.</p>									
know	define	record																				
identify	recall	name																				
relate	memorize	recognize																				
list	repeat	acquire																				
<p><b>2. Comprehension: The ability to grasp or construct meaning from material. Examples of verbs that relate to this function are:</b></p> <table><tr><td>restate</td><td>identify</td><td>Illustrate,</td></tr><tr><td>locate</td><td>discuss</td><td>interpret</td></tr><tr><td>report</td><td>describe</td><td>conclude</td></tr><tr><td>recognize</td><td>review</td><td>represent</td></tr><tr><td>explain</td><td>infer</td><td>differentiate</td></tr><tr><td>express</td><td></td><td></td></tr></table>	restate	identify	Illustrate,	locate	discuss	interpret	report	describe	conclude	recognize	review	represent	explain	infer	differentiate	express			<p><b><u>2. Understanding:</u></b></p> <p>Constructing meaning from different types of functions be they written or graphic messages or activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, or explaining</p>			
restate	identify	Illustrate,																				
locate	discuss	interpret																				
report	describe	conclude																				
recognize	review	represent																				
explain	infer	differentiate																				
express																						
<p><b>3. Application: The ability to use learned material, or to implement material in new and concrete situations. Examples of verbs that relate to this function are:</b></p> <table><tr><td>apply</td><td>organize</td><td>practice</td></tr><tr><td>relate</td><td>employ</td><td>calculate</td></tr><tr><td>develop</td><td>restructure</td><td>show</td></tr><tr><td>translate</td><td>interpret</td><td>exhibit</td></tr><tr><td>use</td><td>demonstrate</td><td>dramatize</td></tr><tr><td>operate</td><td>illustrate</td><td></td></tr></table>	apply	organize	practice	relate	employ	calculate	develop	restructure	show	translate	interpret	exhibit	use	demonstrate	dramatize	operate	illustrate		<p><b><u>3. Applying:</u></b></p> <p>Carrying out or using a procedure through executing, or implementing. <i>Applying</i> relates to or refers to situations where learned material is used through products like models, presentations, interviews or simulations.</p>			
apply	organize	practice																				
relate	employ	calculate																				
develop	restructure	show																				
translate	interpret	exhibit																				
use	demonstrate	dramatize																				
operate	illustrate																					
<p><b>4. Analysis: The ability to break down or distinguish the parts of material into its components so that its organizational structure may be better understood. Examples of verbs that relate to this function are:</b></p> <table><tr><td>analyze</td><td>differentiate</td><td>experiment</td></tr><tr><td>compare</td><td>contrast</td><td>scrutinize</td></tr><tr><td>probe</td><td>investigate</td><td>discover</td></tr><tr><td>inquire</td><td>detect</td><td>inspect</td></tr><tr><td>examine</td><td>survey</td><td>dissect</td></tr><tr><td>contrast</td><td>classify</td><td>discriminate</td></tr><tr><td>categorize</td><td>deduce</td><td>separate</td></tr></table>	analyze	differentiate	experiment	compare	contrast	scrutinize	probe	investigate	discover	inquire	detect	inspect	examine	survey	dissect	contrast	classify	discriminate	categorize	deduce	separate	<p><b><u>4. Analyzing:</u></b></p> <p>Breaking materials or concepts into parts, determining how the parts relate to one another or how they interrelate, or how the parts relate to an overall structure or purpose. Mental actions included in this function are <i>differentiating, organizing, and attributing</i>, as well as <i>being able to distinguish between</i> the components or parts. When one is analyzing, he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.</p>
analyze	differentiate	experiment																				
compare	contrast	scrutinize																				
probe	investigate	discover																				
inquire	detect	inspect																				
examine	survey	dissect																				
contrast	classify	discriminate																				
categorize	deduce	separate																				
<p><b>5. Synthesis: (Now Creating #^)</b> The ability to put parts together to form a coherent or unique new</p>	<p><b><u>5. Evaluating:</u></b></p>																					

<b>whole. Examples of verbs that relate to this function are:</b>			<b>Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation. In the newer taxonomy, <i>evaluating</i> comes before creating as it is often a necessary part of the precursory behavior before one creates something.</b>
compose produce design assemble create prepare predict modify tell	plan invent formulate collect set up generalize document combine relate	propose develop arrange construct organize originate derive write propose	
<b>6. Evaluation: (Now #5) The ability to judge, check, and even critique the value of material for a given purpose. Examples of verbs that relate to this function are:</b>			<b>6. Creating:</b>
judge assess compare evaluate conclude measure deduce	argue decide choose rate select estimate	validate consider appraise value criticize infer	<b>Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way, or synthesize parts into something new and different creating a new form or product. This process is the most difficult mental function in the new taxonomy.</b>

Table 1.1 Comparative Table of Bloom's 1956 with verbs vs. Anderson and Krathwohl's 2001 revised version

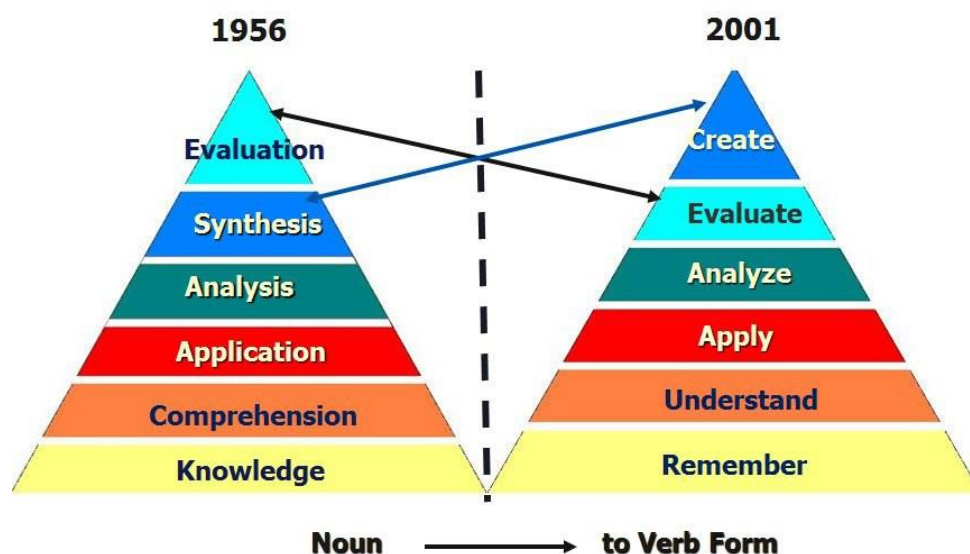


Diagram 1.1 Changes in Bloom's 1956 vs. Anderson & Krathwohl's revised version 2001

## Comments on the changes:

As you will see the primary differences are not in the listings or rewordings from nouns to verbs, or in the renaming of some of the components, or even in the re-positioning of the last two categories. The major differences lie in the more useful and comprehensive additions of how the taxonomy intersects and acts upon **different types and levels of knowledge — factual, conceptual, procedural and metacognitive**. This melding **can be charted** to see how one is teaching at both *knowledge* and *cognitive* processing levels. Please remember the chart goes from simple to more complex and challenging types of thinking.

**Note: Bloom's critically examines his own work** – After creating the cognitive taxonomy one of the weaknesses noted by Bloom himself was that there is was a fundamental difference between his “knowledge” category and the other 5 levels of his model as those levels dealt with intellectual abilities and skills in relation to interactions with **types of knowledge**. Bloom was very aware that there was an acute difference between knowledge and the mental and intellectual operations performed on, or with, that knowledge. He identified specific types of knowledge as:

- Terminology
- Specific facts
- Conventions
- Trends and sequences
- Classifications and categories
- Criteria
- Methodology
- Principles and generalizations
- Theories and structures

**Levels of Knowledge** – The first three of these levels were identified in the original work, but rarely discussed or introduced when initially discussing uses for the taxonomy. **Metacognition** was added in the revised version.

- **Factual Knowledge** – The basic elements students must know to be acquainted with a discipline or solve problems.
- **Conceptual Knowledge** – The interrelationships among the basic elements within a larger structure that enable them to function together.
- **Procedural Knowledge** – How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.
- **Metacognitive Knowledge** – Knowledge of cognition in general, as well as awareness and knowledge of one's own cognition. (29)

(Summarized from: Anderson, L. W. & Krathwohl, D.R., et al (2001) *A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives*. New York: Longman.)

One of the things that clearly differentiates the new model from that of the 1956 original is that it lays out components nicely so they can be considered and used. Cognitive processes, as related to chosen instructional tasks, can be easily documented and tracked. This feature has the potential to make teacher assessment, teacher self-assessment, and student assessment easier or clearer as usage patterns emerge. (See PDF link below for a sample.)



As stated before, perhaps surprisingly, these levels of knowledge were indicated in Bloom's original work – **factual, conceptual, and procedural** – but these were never fully understood or used by teachers because most of what educators were given in training consisted of a simple chart with the listing of levels and related accompanying verbs. The full breadth of *Handbook I*, and its recommendations on types of knowledge, were rarely discussed in any instructive or useful way. Another rather gross lapse in common teacher training over the past 60+ years is teachers-in-training are rarely made aware of any of the criticisms leveled against Bloom's original model.

Please note that in the updated version the term “**metacognitive**” has been added to the array of knowledge types. For readers not familiar with this term, it means *thinking about ones thinking in a purposeful way* so that one knows about cognition and also knows how to regulate one's cognition.

The Knowledge Dimensions	Cognitive Processes					
	1. Remember	2. Understand	3. Apply	4. Analyze	5. Evaluate	6. Create
Factual						
Conceptual						
Procedural						
Metacognitive						

Table: 1.2 colored version from original by Anderson, L. W. and Krathwohl, D. R., et al (Eds..) (2001)

#### Knowledge Dimensions Defined:

**Factual Knowledge** is knowledge that is basic to specific disciplines. This dimension refers to essential facts, terminology, details or elements students must know or be familiar with in order to understand a discipline or solve a problem in it.

**Conceptual Knowledge** is knowledge of classifications, principles, generalizations, theories, models, or structures pertinent to a particular disciplinary area.

**Procedural Knowledge** refers to information or knowledge that helps students to do something specific to a discipline, subject, or area of study. It also refers to methods of inquiry, very specific or finite skills, algorithms, techniques, and particular methodologies.

**Metacognitive Knowledge** is the awareness of one's own cognition and particular cognitive processes. It is strategic or reflective knowledge about how to go about solving problems, cognitive tasks, to include contextual and conditional knowledge and knowledge of self.

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**\*\*End Note:** The very useful things about any of the taxonomies associated with learning are that **they become tools that allow educators to analyze and categorize students' tasks**. Educators can then look for frequency patterns within instructional events. Are my tasks evenly balanced, or are they over concentrated in limited areas? This type of in-depth examination

leads to professional self-analysis of performance and this is a key element of **reflective practice**. Professionally, reflective educators are often better teachers because they are constantly trying to improve their methods of organization and delivery.

The following PDF attachment is an example of how I used Bloom's revised taxonomy to reflectively assess what I was asking my students to do on a particular assignment. [Artifact2chart](#) If you need more information on the original assignment that goes with the chart, please contact me.

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## Sources:

(As these hotlinks take readers to Amazon, the FTC requires me to indicate that they qualify as ads)

Anderson, L. W. and Krathwohl, D. R., et al (Eds..) (2001) *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon. Boston, MA (Pearson Education Group) **\*\*There is a newer (2013), abridged, less expensive version of this work. #ad**

Bloom, B.S. and Krathwohl, D. R. (1956) *Taxonomy of Educational Objectives: The Classification of Educational Goals, by a committee of college and university examiners. Handbook I: Cognitive Domain*. NY, NY: Longmans, Green

Dave, R.H. (1970). *Psychomotor levels in Developing and Writing Behavioral Objectives*, pp.20-21. R.J. Armstrong, ed. Tucson, Arizona: Educational Innovators Press.

Harrow, A. (1972) *A Taxonomy of Psychomotor Domain: A Guide for Developing Behavioral Objectives*. New York: David McKay.

Krathwohl, D.R., Bloom, B.S., Masia, B.B. (1964). *Taxonomy of Educational Objectives, the Classification of Educational Goals. Handbook II: Affective Domain*. New York: David McKay Co., Inc.

Krathwohl, D. R. (2002) **A Revision of Bloom's Taxonomy. (PDF) in** *Theory into Practice*. V 41. #4. Autumn, 2002. Ohio State University. Retrieved @ <https://www.depauw.edu/files/resources/krathwohl.pdf>

Simpson E.J. (1972). *The Classification of Educational Objectives in the Psychomotor Domain*. Washington, DC: Gryphon House.

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A previous iteration of this page was originally published in my ED 721 (2001) course handbook, and at: <http://www4.uwsp.edu/education/lwilson/curric/newtaxonomy.htm> (2001, 2005), revised 2013,

The Anderson/Krathwohl text has numerous examples of how these concepts can be used for K-12 teachers. Since I have used this material in my teaching (a special topics graduate course on taxonomies and their uses entitled *Beyond Bloom's*) and have also presented on this topic in several national conferences, **I have artifacts and examples of how these revisions can be used effectively in college teaching. While I have a link above to an artifact, to be fully understood you might need to view the original assignment and the supportive documents. I would be happy to provide those and discuss them more fully. I am always happy to share information with other educators.**