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Leslie Owen Wilson's Curriculum Pages

Beyond Bloom - A new Version of the Cognitive Taxonomy

Leslie Owen Wilson 2006, [restrictions on usage](#)

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Background: In the late 1950s into the early 1970s here in the US there were attempts to dissect and classify the varied domains of human learning - **cognitive** (knowing, head), **affective** (feeling, heart) and **psychomotor** (doing, hand/body). The resulting efforts yielded a series of taxonomies in each area. A taxonomy is really just a word for a form of classification. The aforementioned taxonomies deal with the varied aspects of human learning and are arranged hierarchically proceeding from the simplest functions to those that are more complex.

While all of the taxonomies above have been defined and are explained in this site via the hotlinks, the material below is a simple overview of the newer version of the cognitive domain. You can also search the Web for various references on these different taxonomies, as well as explore the active hyperlinks below. There are many valuable discussions of the development of the varied taxonomies and examples of their usefulness and application in teaching. If you find that some of my links are not working, please let me know through my e-mail link as I know how frustrating that can be. Also, if you have additional related resources that you think I might be interested in, **please write** sending the URL.

The Cognitive Domain: In the following table are the two primary existing taxonomies of cognition. The 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. This taxonomy is over 50 years old.

The taxonomy on the right is the more recent adaptation and is the redefined work of one of Bloom's former students, Lorin Anderson, working with one of Bloom's partners in the original work on cognition, David Krathwohl. That one is labeled **Anderson and Krathwohl**. The new taxonomy was a larger group effort lead by Anderson and Krathwohl as they worked on this task from from 1995-2000. The group was assembled by the primary authors and included people with expertise in the areas of cognitive psychology, curriculum and instruction, and educational testing, measurement, and assessment.

As you will see the primary differences are not just in the listings or rewordings from nouns to verbs, or in the renaming of some of the components, or even in the repositioning of the last two categories. The major differences in the updated version is 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.

Taxonomies of the Cognitive Domain:

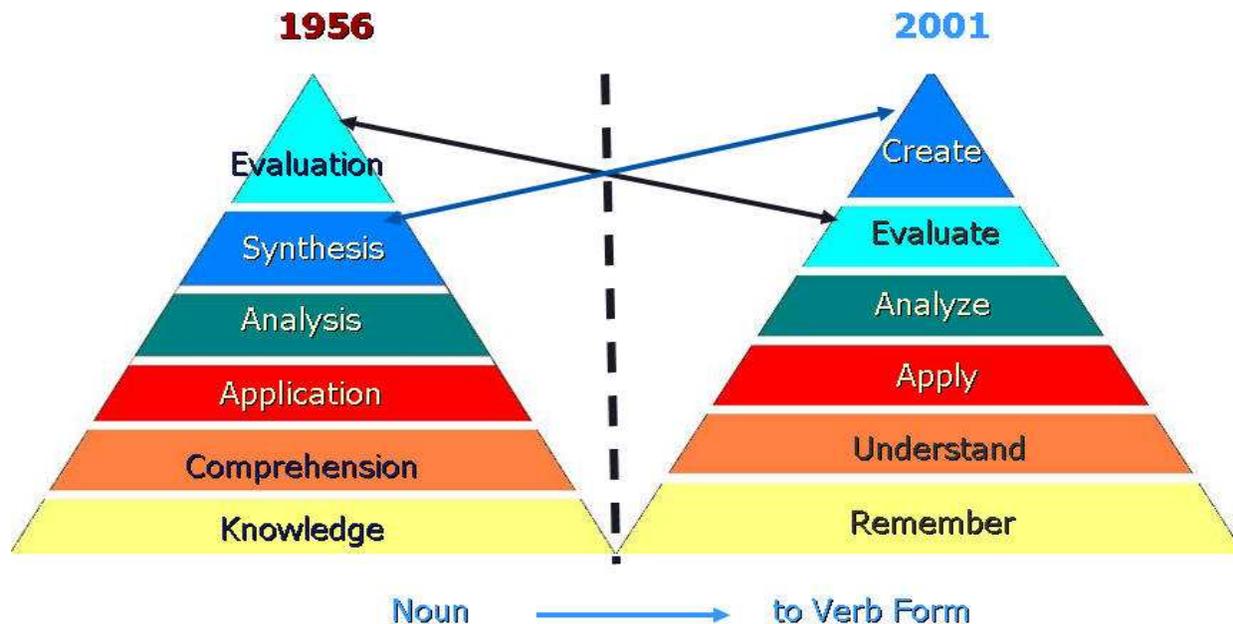
Bloom's Taxonomy 1956	Anderson and Krathwohl's Taxonomy 2000																		
<p>Knowledge: Remembering or retrieving previously learned material. Examples of verbs that relate to this function are:</p> <table border="0"> <tr> <td>know</td> <td>define</td> <td>record</td> </tr> <tr> <td>identify</td> <td>recall</td> <td>name</td> </tr> <tr> <td>relate</td> <td>memorize</td> <td>recognize</td> </tr> <tr> <td>state</td> <td>repeat</td> <td>acquire</td> </tr> </table>	know	define	record	identify	recall	name	relate	memorize	recognize	state	repeat	acquire	<p>1. Remembering: Retrieving, recalling, or recognizing knowledge from memory. Remembering is when memory is used to produce definitions, facts, or lists, or recite or retrieve material.</p>						
know	define	record																	
identify	recall	name																	
relate	memorize	recognize																	
state	repeat	acquire																	
<p>Comprehension: The ability to grasp or construct meaning from material. Examples of verbs that relate to this function are:</p> <table border="0"> <tr> <td>relate</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>draw</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>conclude</td> <td></td> </tr> </table>	relate	identify	illustrate	locate	discuss	interpret	report	describe	draw	recognize	review	represent	explain	infer	differentiate	express	conclude		<p>2. Understanding: Constructing meaning from different types of functions be they written or graphic messages activities like interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.</p>
relate	identify	illustrate																	
locate	discuss	interpret																	
report	describe	draw																	
recognize	review	represent																	
explain	infer	differentiate																	
express	conclude																		
<p>Application: The ability to use learned material, or to implement material in new or concrete situations. Examples of verbs that relate to this function are:</p> <table border="0"> <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>3. Applying: Carrying out or using a procedure through executing, or implementing. Applying related and 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>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:</p> <table border="0"> <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> </table>	analyze	differentiate	experiment	compare	contrast	scrutinize	probe	investigate	discover	inquire	detect	inspect	<p>4. Analyzing: Breaking material or concepts into parts, determining how the parts relate or interrelate to one another or to an overall structure or purpose. Mental actions included in this function are differentiating, organizing, and attributing, as well as being able to distinguish between 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																	

<p>examine contrast categorize</p> <p>survey classify deduce</p> <p>dissect discriminate separate</p>	
<p>Synthesis: The ability to put parts together to form a coherent or unique new whole. Examples of verbs that relate to this function are:</p> <p>compose produce design assemble create repare predict modify sell</p> <p>plan invent formulate collect set up generalize document combine relate</p> <p>propose develop arrange construct organize originate derive write propose</p>	<p>5. Evaluating: 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 evaluation comes before creating as it is often a necessary part of the precursory behavior before creating something.</p> <p>■ Remember this one has now changed places with the last one on the other side.</p>
<p>Evaluation: 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:</p> <p>judge assess compare evaluate conclude measure deduce</p> <p>argue decide choose rate select estimate</p> <p>validate consider appraise value criticize infer</p>	<p>6. Creating: 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 a new form or product. This process is the most difficult mental function in the new taxonomy.</p> <p>■ This one used to be #5 in Bloom's known as synthesis.</p>

Table 1.1 Bloom vs. Anderson/Krathwohl

Visual comparison of the two taxonomies

Changes to Bloom's



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, and so 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.

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. Nor were teachers in training ever made aware of any of the criticisms leveled against the original model. Please note that in the updated version the term "*metacognitive*" has been added to the array of knowledge types.

Here are the intersections as the processes impact the levels of knowledge. Using a simple cross impact grid or table like the one below, one can match easily activities and objectives to the types of knowledge and to the cognitive processes as well. It is a very useful tool to use in assessing how instruction is actually impacting levels of learning. Teachers can also use it to track which levels of cognition they are requiring from students, as well as which dimensions of knowledge.

Cognitive Processes

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

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, 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.

A comprehensive example from the book is provided with publisher permission at <http://www.scribd.com/doc/933640/Bloom-Revised>

Sources:

Anderson, L. W. and David R. 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)

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



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- ✿ Behavioral objectives
- ✿ Holistic objectives
- ✿ Non-behavioral objectives
- ✿ Problem solving objectives
- ✿ Expressive activities that lead to expressive

Other links to information about this topic:

✿ Tech and Learning -- Give it a minute to come up, nicely done diagrams

with some great new information

✿ More on the cognitive domain

✿ An e-book from Coe College

✿ **Wonderfully succinct and comprehensive overview of both taxonomies is provided by Mary Forehand at the University of Georgia in a Wikipedia type format, see Bloom's taxonomy

outcomes

- ✿ Cognitive Objectives

- ✿ Affective Objectives

- ✿ Psychomotor

- Objectives

- ✿ Sample lessons

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