

THE NEW BLOOM'S TAXONOMY: AN OVERVIEW FOR FAMILY AND CONSUMER SCIENCES

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Educators today struggle with the design and implementation of standards-based curriculums, authentic assessments, and accountability programs. Since publication of Bloom's Taxonomy of Educational Objectives in 1956, numerous changes have occurred in our culture that influence how we think about and practice education. New knowledge of how students learn as well as how teachers plan lessons, teach learners, and assess learning has been incorporated into a revision of Bloom's Taxonomy of Education Objectives. This revision is being incorporated into Career and Technical Education as well as K-12 education in several states. The Family and Consumer Sciences literature provides little published information about the Revised Bloom's Taxonomy (RBT) and its use. Family and Consumer Sciences professionals should become familiar with the new model used for designing, teaching, and assessing education to determine its application for their work.

For over fifty years, Family and Consumer Sciences teacher preparation programs have provided students the framework of Bloom's Taxonomy to categorize subject matter content into learning objectives. Leaving their curriculum and methods classrooms, college students' heads would be spinning with terms such as "cognitive," "psychomotor," and "affective," and their notebooks filled with verb lists for each domain. They would retreat to their desks, tasked with developing educational units and creating terminal and enabling objectives leading to measurable outcomes.

Bloom's Taxonomy is a familiar tool of educators. Although named after Benjamin Bloom, the taxonomy was actually the work of the many individuals hired to help manage the influx of veterans into the education system following World War II. Discharged soldiers, home from fighting World War II, were eligible for the GI education stipend, which paid college tuition, textbook fees, living expenses, and support for the ex-soldier's dependents. The GI stipend enabled many World War II veterans to attend college, flooding campuses with new students even though few new faculty members were hired to educate this deluge of students. In recognition of the life experiences of these veterans, the concept of "credit-by-examination" was developed with support from the Department of Defense (DOD). Even today, the DOD influences education with a program known as Defense Activities for Non-Traditional Education Support (DANTES). The DOD through DANTES (Troops to Teachers, n.d.) supports the "Troops to Teachers" program, which facilitates preparing retiring military personnel to become teachers.

The work that eventually became the Taxonomy of Education resulted from the collective efforts of many including the psychology graduates hired to design, administer, and score tests for college-credit-by-examination, hence their title of "Examiners." The Examiners first met formally following the annual meeting of the American Psychological Association (APA) in 1948. They continued to meet after the annual APA conventions to further their discussions of ways to define and structure intellectual content. They were attempting to make sense of the

multiple educational fields needing tests, with a goal of reducing the complexity of their tasks by categorizing knowledge into hierarchies. Once developed, these hierarchies would provide them with a framework for writing test items in a variety of subjects.

The examiners saw natural scientists use the Kingdoms of Life Taxonomy to organize their biological specimens from simple to complex animals and plants (Spaner, 2000). The examiners believed such a schema would be useful for categorizing the types of knowledge they were trying to measure with their tests (Anderson & Krathwohl, 2001 p. 4). However, the examiners identified three problems involved in creating such a system. First, what they were dealing with was not tangible and could not be examined and dissected as the natural scientists did with their specimens. Second, they feared the creation of a schema might tend to short-circuit educator's thinking and planning. Third, some feared that a classification of learning would result in fragmentation and endless repetition of the existing curriculum (Spaner, 2000).

In spite of these concerns, these psychology-trained examiners decided a classification system represented an appropriate starting place to measure student knowledge and understanding. As psychologists, they wanted a convenient system for describing and ordering test items, examination techniques, and evaluation instruments; and they believed a classification system would enable educators to compare and study educational programming (Anderson, 2006). They also hoped that their system would serve to establish an order for educational goals. By 1956, their efforts resulted in Bloom's Taxonomy of Educational Objectives, named by default since Benjamin Bloom was the first name in the alphabetic list of authors (Anderson, 2006.). This classic work on knowledge levels has influenced curriculum theory and practice for the last fifty years. However, its authors always considered it a work in progress, neither finished nor final (Anderson & Krathwohl, 2001, p xxxvii). The examiners whose efforts led to the development of the original framework expected it to facilitate the exchange of test items among their cooperating institutions.

Bloom's Taxonomy contains three overlapping domains: the cognitive, psychomotor, and affective, also known as knowledge, skills, and attitudes (KSA). The taxonomy was a means to express qualitatively the different kinds of intellectual skills and abilities. The cognitive and affective domains provided a way to organize thinking skills into six levels, from the most basic to levels that are more complex. It was a one-dimensional cumulative hierarchy, with achievement at each lower level considered necessary to move up to the next level (Anderson, 2006). The original development committee produced the hierarchical levels for the cognitive and affective domains, but not for the psychomotor domain. Their explanation for this omission was that they saw little need to teach manual skills to college students (Anderson & Krathwohl, 2001) thus completely overlooking athletics, drama, and applied programs of study such as music. Ten years later, home economist Elizabeth Simpson presented a schema for classifying educational objectives in the psychomotor domain, published in the *Illinois Teacher of Home Economics* and documented within ERIC References (Simpson, 1966). Simpson later became chief of the Curriculum Development Branch, Division of Research and Demonstration with the Bureau of Occupational and Adult Education in the US Office of Education (Simpson, 1973).

Requests were made to Dr. Lorin Anderson, a former student of Bloom's at the University of Chicago, to update the Taxonomy prior to his retirement. At the urging of publishers and education professionals, he agreed to the task, to reflect the enlarged understanding of the teaching and learning processes now available. He and co-editor, the elderly David Krathwohl, one of the editors of the original taxonomy, collaborated with seven other educators to produce the revised Taxonomy. The collaborators agreed that the original taxonomy

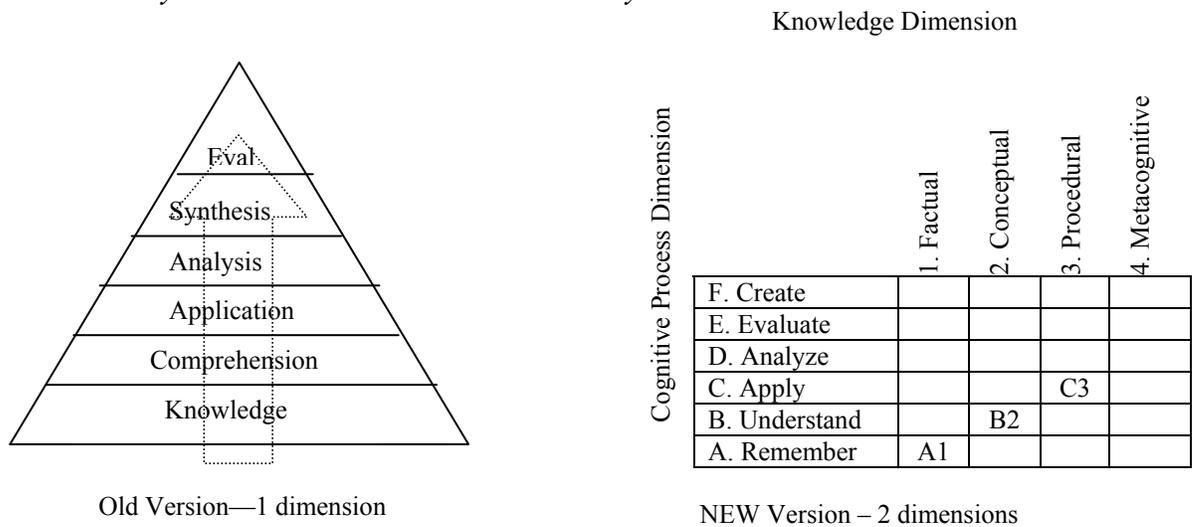
was ahead of its time, since alternative frameworks were nonexistent until Gagne’s learning outcome classification scheme became available in 1977 and Merrill’s *Performance-Content Matrix*, as part of his *Component Display Theory* did not appear until 1983.

During the revision processes, the editors identified 19 alternative frameworks, developed to supplement, clarify, and improve upon the original Bloom’s Taxonomy. The alternative frameworks were examined to determine how they might contribute to the revision of the updated taxonomy. Of these, 11 represented a single dimension like the original taxonomy while eight frameworks represented two or more dimensions as the Revised Bloom’s Taxonomy (RBT) does. The *Complete Edition: A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom’s Taxonomy of Educational Objectives* includes a chapter and matrices that explain these alternative systems contributions. The abridged edition, bound in paper and targeted to undergraduates, does not include the chapter that examines and cross-references the alternative frameworks. The alternative frameworks are listed in the Appendix.

Academic Standards and the Revised Bloom’s Taxonomy

As America’s relative position among educated countries continues to decline, other nations produce more intellectually capable citizens (Peterson, 2002). One attempt to address this decline of intellectual capital in American has been the development benchmarks and educational standards. The standards are important guides for educators because they define the parameters of instruction. Strengthening the alignment of standards with instruction and assessment serves to focus instruction with the intention of making teaching more effective. The RBT is seen as “a tool to help educators clarify and communicate what they intended students to learn as a result of instruction” (Anderson & Krathwohl, 2001, p 23). Incorporated into the RBT are advances in teaching and learning since publication of the original. The term *knowledge* was deemed an inappropriate term to describe a category of thinking and was replaced with the term *remembering*. In addition, the revision reconceptualized the original single dimension taxonomy into two dimensions with both a *Cognitive Process Dimension* and a *Knowledge Dimension*.

Figure 1.
Bloom’s Taxonomy and the Revised Bloom’s Taxonomy



The top two levels are essentially exchanged from the old to the new version

Anderson, L. (2006, May)

As illustrated in Figure 1, the RBT is not a cumulative hierarchy, as the original was. Instead, the six stages are viewed as a “cognitive processing” dimension. Our current concepts of learning view students as active participants in the learning process. Students select the information to which they attend and construct their own meanings from the selected information. This constructivist perspective of learning emphasizes how learners *cognitively process* new knowledge as they engage in meaningful learning. Thus, the cognitive process dimension reflects students’ cognitive and metacognitive activity as expressed within the opportunities and constraints of the learning setting. “This constructivist process of ‘making sense’ involves the activation of prior knowledge as well as various cognitive processes that operate on that knowledge” (Anderson & Krathwohl, 2001, p. 38). Other educational taxonomy frameworks reflect the concept of cognitive processing. For example, both *Dimensions of Learning*, (first published in 1988 and revised in 1997 by Marzano and Pickering) and *Understanding by Design* (by Wiggins and McTighe first published in 1998, and expanded in a 2005 second edition) include the concept of cognitive processing, which is basic to our understanding of constructivist learning theory. In addition to the cognitive processing dimension, the RBT authors identified four general types of knowledge: *factual, conceptual, procedural, and metacognitive* which make up the Knowledge Dimension.

Table 1.
The Cognitive Processing Dimension of the Revised Bloom’s Taxonomy

Dimension	Examples of the cognitive processes involved
Remember: can the student recall or remember the information?	define, duplicate, list, memorize, recall, repeat, reproduce state
Understand: can the student explain ideas or concepts?	classify, describe, discuss, explain, identify, locate, recognize, report, select, translate, paraphrase
Apply: can the student use the information in a new way?	choose, demonstrate, dramatize, employ, illustrate, interpret, operate, schedule, sketch, solve, use, write
Analyze: can the student distinguish between the different parts?	appraise, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test
Evaluate: can the student justify a stand or decision?	appraise, argue, defend, judge, select, support, value, evaluate
Create: can the student create new product or point of view?	assemble, construct, create, design, develop, formulate, write

Anderson, L. (2006, May)

Within the knowledge dimension is basic information that students must remember to be acquainted with a discipline or solve a problem. Labeled *factual knowledge*, this may include terminology of the discipline or knowledge of specific details. Factual knowledge includes the discrete facts and basic elements that experts use when communicating about their discipline, understanding it, and organizing it systematically; there is little abstraction to factual knowledge.

Because of the explosion of knowledge within all subjects, curriculum designers, textbook authors, and teachers must decide what is critical to include and what is of lesser importance. Many educators now recognize that memorization of discrete facts is not highly

productive knowledge, since so much information today is a few keystrokes away on the internet. Family and Consumer Science teachers often agonize over which facts to teach directly and what to leave out for students to acquire later when they need the knowledge (e.g. housing, clothing, vitamin deficiency diseases not usually seen in the general population, and interpersonal relationships).

Table 2.
The Separate Knowledge Dimension of the Revised Bloom's Taxonomy

Types of Knowledge	Examples
A. Factual Knowledge —the basic elements students must know to be acquainted with a discipline or solve problems in it	
a. knowledge of terminology	▪ Technical vocabulary, chemical elements
b. knowledge of specific details and elements	▪ Personal and family resources, reliable sources of information
B. Conceptual Knowledge —the interrelationships among the basic elements within a larger structure that enable them to function together	
a. knowledge of classifications and categories	▪ stages of pregnancy, forms of business ownership
b. knowledge of principles and generalizations	▪ starch cookery principles, law of supply and demand
c. knowledge of theories, models and structures	▪ color theory, organizational charts
C. Procedural Knowledge —How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods	
a. knowledge of subject-specific skills and algorithms	▪ Skills used in interior design, whole-number division algorithm
b. knowledge of subject-specific techniques and methods	▪ Interviewing techniques, scientific method
c. knowledge of criteria for determining when to use appropriate procedures	▪ Criteria used to determine what a family can spend on housing. Criteria used to judge the feasibility of using a particular method to estimate business cost
D. Metacognitive Knowledge —knowledge of cognition in general as well as awareness and knowledge of one's own cognition	
a. strategic knowledge	▪ Knowledge of outlining as a means of capturing the structure of a unit subject matter in a textbook, knowledge of the use of heuristics
b. knowledge about cognitive tasks, including appropriate contextual and conditional knowledge.	▪ Knowledge of the types of tests particular teachers administer, knowledge of the cognitive demands of different tasks
c. self-knowledge	▪ Knowledge that critiquing essays is a personal strength, whereas writing essays is a personal weakness; awareness of one's own knowledge level

Anderson, L. (2006, May)

Conceptual knowledge is more complex than factual knowledge and includes three subtypes: 1) knowledge of classifications and categories, 2) knowledge of principles and generalizations, and 3) knowledge of theories, models, and structure (Anderson & Krathwohl, 2001). When students can explain the concepts in their own words and transfer information to new situations they have acquired conceptual knowledge. For example, an explanation of how a starch structure may break down in the presence of acid and heat (e.g., lemon meringue pie filling made with cornstarch or flour) would indicate the student has acquired conceptual

knowledge of this cooking procedure. Chamberlain and Cummings (2003) indicate that concepts can be defined and characterized, and that generalizations show relationships among concepts. Classifications and categories of concepts form the basis for principles and generalizations. Principles and generalizations form the basis for theories, models, and structures (Whitehead, 2005). Classification, principle, and theory capture the greatest amount of intellect within widely different disciplines (Anderson & Krathwohl, 2001).

Both factual and conceptual knowledge deal with products, however *procedural knowledge* is often a series or sequence of steps to follow. Procedural knowledge also includes criteria of when to use various procedures and reflects knowledge of different processes. Examples of procedural knowledge could include syntax of an essay, development of a Students Taking Action with Recognition (STAR) event for Family, Career and Community Leaders of America or application of art and design principles in a display board for interior design. Meaningful learning provides students with the knowledge and cognitive processes they need for successful problem solving. Problem solving occurs when a student devises a way of achieving a goal never before accomplished, often by reformulating the problem into a more familiar form, recognizing the similarity, and applying the method in solving for the new knowledge.

The fourth dimension of knowledge is *metacognitive knowledge*, an awareness of and knowledge about one's own thinking. The metacognitive knowledge concept is an emerging milestone in our understanding of learning since the publication of the original taxonomy. Today emphasis is on making students more aware of and responsible for their own knowledge and thought, a paradigm change which is applicable across multiple models including Piagetian, Vygotskian, and situated learning theories (Anderson & Krathwohl, 2001; Marzano, Pickering & Pollock, 2001). However, Flavell (1979) cautioned that the students might need assistance in distinguishing the knowledge of cognition and the monitoring, control, and regulation of cognition. Students may acquire some of the information from their study, but may not have the ability to monitor the learning conditions or make adaptations within their learning process to facilitate acquiring more than superficial understanding and knowledge. One way in which students can be helped to develop their metacognitive knowledge is to ask them to log the amount of effort they make in completing assignments and studying for tests. When they begin to reflect on how much effort they have made, they become aware that often they fail to make the necessary effort in their study, which is reflected in less than optimum achievement (Marzano, Norford, Paynter, Pickering & Gaddy, 2001).

A major contribution that the revised taxonomy can make is in the way educators think about instruction. The intersection of the cognitive process dimensions and the knowledge dimensions can facilitate instructional planning and assessment. When educators plan how they will assess learning, the intersection of the cognitive processing and knowledge dimension can facilitate the selection of learning activities that will provide for modeling and practice using the intended assessment format. Use of the RBT enables educators to specify how they expect students to use specified knowledge and thus provide learning experiences to assist students to reach that cognitive stage. The matrix also streamlines the list of verbs used in generating learning objectives to precise descriptions of the expected outcomes. During the revision, the RBT editors also examined over 500 representative learning and content standards produced by several states to identify the kinds of learning being required in today's classrooms, which was valuable as they conceptualized the Cognitive Processing domain. From this analysis of content standards, they determined that the majority of the learning and content standards are found in cells A1, B2, and C3, as in Figure 1, with the majority of learning requiring students to

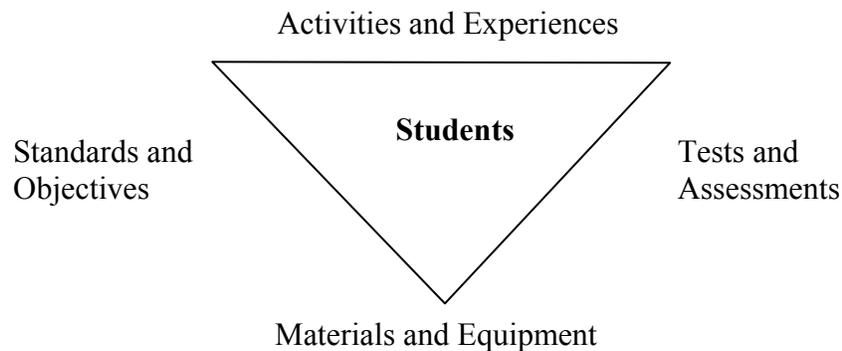
understand conceptual knowledge (BS). With the revised taxonomy, teachers may use “A1, B2, and C3” as a shorthand process for writing objectives. In the original Bloom’s Taxonomy, there were at least 229 possible verbs, which could have been used in formulating objectives.

A strategy for Family and Consumer Sciences teacher educators to use when helping pre-service FCS teachers formulate a conceptualization of the RBT is to use the metaphor of a recipe. The standard recipe format consists of the ingredient list followed by the directions, which tell the cook how to combine the ingredients. The ingredient list is the factual knowledge, while the directions or method for preparing the recipe is the procedural knowledge (i.e., the steps to follow). With conceptual knowledge, the cook could make appropriate substitutions of ingredients. Since metacognitive knowledge allows the learner to make strategic modifications in the procedure, the cook with metacognitive knowledge would understand which recipes to avoid when the humidity is high or how to combine the ingredients on hand in the pantry into a finished meal, without referring to a written recipe or menu. These individuals have a metacognitive knowledge about food preparation and meal planning. This metacognitive knowledge is in addition to factual and procedural knowledge generally called upon in preparing recipes and menus for which specific ingredients and foods have been purchased.

Revised Taxonomy and Curriculum Decisions

The structure of curriculum illustrated in Figure 2 is a representation of four fundamental questions: What should be taught? How should it be taught? How should learning be measured? Who are the learners? Because instructional time is limited, decisions must be made concerning what to teach and what to delete from the curriculum. The activities and experiences depend on what materials and equipment are available as instructional resources. The curricular goals and objectives are described in terms of the activities and experiences that can be provided to the students.

Figure 2.
The Structure of Curriculum



Anderson, L. (2006, May)

In the past, it may have been acceptable to have only a few students within the classroom reaching high levels of accomplishment and grade distributions reflect a bell shaped curve. In today’s education climate, the expectation is that all students will make adequate yearly progress. Thus, it is critical to align curriculum objectives, teaching, and assessment more closely than before. The educational standards are “mandated objectives that someone, usually a group such

as a professional association or statewide committee, thinks are important” (Anderson & Krathwohl, 2001, p. 19). Like people, educational standards come in a variety of sizes and shapes. Some are more general, others are more specific, and some fall between the extremes. Most standards documents have three levels ranging from general (global), to educational, to specific (instructional); and different terminology is often used for the various levels as illustrated in Table 3.

Table 3
Relationship of Global, Educational, and Instructional Objectives

	Global	Educational	Instructional
Scope	Broad	Moderate	Narrow
Time needed to learn	One or more years (often many)	Weeks or months	Hours or days
Purpose or function	Provide vision	Design curriculum	Prepare lesson plans
Example of Use	Plan a multi-year curriculum	Plan units of instruction	Plan daily activities, experiences and exercises

Anderson, L. (2006, May)

Despite these differences in terminology, the overall structure of standards/objectives is the same across subject matters. Mandated, standardized end-of course assessments require teachers to align their instruction with the standard course of study adopted by a state’s department of education or instruction. This is where the RBT will aid educators to insure that all students make adequate yearly progress. The use of the RBT will facilitate a micro-level of alignment since the instructional objective’s verb will indicate the specific type of knowledge to be tested. A common format of subject, verb, object (SVO) is used for all objectives including standards. The subject is the student, the verbs include “will,” “should,” or “may,” and define educators’ commitment to student learning. The second verb describes one component of our learning intention: recall, illustrate, use, organize, critique, or produce. It is the second verb that asked the important question: “What?” The answer to the WHAT question is the object of learning. The standards/objectives become statements of intended learning (what we expect, wish, and hope students learn because of instruction). The purpose for having objectives is to ensure education positively influences the learners.

Even before publication of the first iteration of Bloom’s Taxonomy in 1956, a debate raged about how specific educational goals or objectives should be (Anderson & Krathwohl, 2001, p 20). That debate continues in relation to standards/objectives today. The lock-step nature of objectives that prescribes the same learning outcomes for all students results in criticism that not all that is of value to learn is identified with the specificity of today’s standards. Not all students learn the same things from instruction even with specific objectives. “Ancillary learning is always going on” (Anderson & Krathwohl, 2001, p. 21). The heart of the criticism of objectives is that they narrowly define learning outcomes and hence create the risk of simplistic rote learning. Emphasis on authentic learning encourages the use of assessment procedures that permit students to produce varieties of acceptable evidence appropriate for educational objectives (Custer, 2000). Use of the Revised Bloom’s Taxonomy facilitates authentic learning

which occurs when the students reach beyond imitation or reproduction of information and are able to analyze and interpret information to solve a problem that can't be solved by information retrieval alone (Brown, 1998).

The Revised Bloom's Taxonomy is a tool to clarify and communicate to teachers, students, parents, and school patrons, the intended outcomes resulting from instruction. A standard format for learning objectives facilitates communication, and identifies the cognitive process and outcomes for instruction. The emphasis is on explicit and indisputable statements of intended cognitive outcomes. The revised framework no doubt will be used in many ways, by many, but not necessarily all educators, just as some declined to use the first iteration.

In spite of being available since 2001, only now is the revised taxonomy on the horizon for educators. Science and Family and Consumer Sciences secondary curriculum developers in at least two states along the eastern seaboard are using the RBT to more precisely formulate examination questions, define performance indicators and develop rubrics for authentic assessments, as well as to insure that what is measured by the mandated end-of-course tests is taught.

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Appendix

Alternative Frameworks compared in the preparation of the Revised Bloom's Taxonomy

One-dimensional Classification Systems

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