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### Bloom's Taxonomy, a closer look!

Bloom's Taxonomy of Educational Objectives (1956) classifies cognitive behaviors according to a hierarchy of domains, by providing a framework for viewing the educational process, for classifying goals of the educational system, and for specifying objectives for learning experiences. The taxonomy has been widely adapted for numerous contexts and is comprised of three main elements: (i) the cognitive domain, (ii) the affective domain; and (iii) the psychomotor domain. It is used primarily for writing educational objectives (Krathwohl, 2002). Each domain is further broken down into the levels of learning from the lowest to the highest. Bloom's hierarchy will also be described in greater detail and as Marzano (2000) emphasizes each higher skill should build upon the skills beneath.

According to Anderson and Krathwohl (2001), the affective domain has five levels that deal with the emotions of individuals and typically incorporates attitudes, emotions, and feelings. The psychomotor domain primarily deals with an individual's ability to manipulate a tool and focuses on changes in their behavior or skills (Anderson & Krathwohl, 2001). The cognitive domain has six levels that deal with the individual's ability to think through problems and focuses on their ability to know, comprehend, apply, analyze, synthesize and evaluate information. For instance, if a teacher is teaching a business communication course, she would want her students to be able to correctly identify or recall the components of communication. The recall of that information would be an example of a cognitive domain learning objective. Krathwohl (2002) states that Bloom saw the taxonomy as more than a measurement tool. Bloom believed it could serve as a:

1) Common language about learning goals to facilitate communication across persons, subject matter, and grade levels.

2) Basis for determining for a particular course or curriculum the specific meaning of broad educational goals, such as those found in the currently prevalent national, state and local standards.

3) Means for determining the congruence of educational objectives, activities, and assessment in a unit, course, or curriculum.

4) Panorama of the range of educational possibilities against which the limited breadth and depth of any particular educational course or curriculum could be considered (Krathwohl, 2002, p. 212).

Bloom became famous for his work with taxonomies of educational objectives, his perspectives on the impact of environment and heredity on intelligence, and his emphasis on mastery learning. Bloom's taxonomy has stood the test of time for learning, teaching, and assessment. Therefore, this paper will discuss the history, application, critiques of and alternatives to Bloom's taxonomy in educational research, curriculum and instruction.

At a 1948 APA meeting, 34 academics agreed to develop a handbook that would convey "the theoretical framework which could be used to facilitate communication among examiners" (Bloom, Engelhart, Furst, Hill & Krathwohl, 1956, p. 4). The group also decided that a complete taxonomy would be divided into the three domains: cognitive, affective and psychomotor. The one that became popular is the cognitive domain. According to Seaman (2011), after an initial draft was completed, members of the committee shared it with professional colleagues, graduate students, test developers, and educational practitioners for critiquing. Seaman further highlighted

that the comments and critiques of those persons were carefully considered and many new ideas were incorporated into subsequent revisions of the draft (Seaman, 2011, p. 30). Despite some alterations and revisions since the time of its creation, the taxonomy still maintains its relevance in the learning environment.

The relevance and applications of Bloom's taxonomy are critically important to the field of education and has been from its initial development. There has been appropriate use and misuse of the taxonomy over the decades. The first misapplication of Bloom's taxonomy is it is often used to justify reduced expectations about student's capacity to think (Case, n.d). Case also purports that Bloom's taxonomy as a theory of teaching is seen to suggest that lower order outcomes are learned through lower order activities and he further suggests there is misplaced confidence created by the taxonomy (Case, n.d., p. 3). It has maintained its impact and consistency based on the future of curriculum planning and development. Bloom's research in this area resulted in an educational shift, with increased focus on the early years of development (Seaman, 2011). Bloom's interests also included how to identify and provide highly favorable learning conditions. In his research, he found that mastery learning, including detailed trials tests and a variety of feedback correctives, can be used to improve levels of learning of groups of students and to help them to correct learning errors (Brandt, 1979). Since the 1956 publication of the 'original' Bloom's taxonomy, several weaknesses and practical limitations have been revealed.

Many educators, over the years, have critiqued Bloom's taxonomy to test its use in the classroom; some have even suggested the language used in the taxonomy is "too abstract" for proper application in assessment (Stanley & Bolton, 1957, p. 631). Stanley and Bolton posit that although the taxonomy is a valuable tool for the construction of test questions, classroom

teachers do not find it useful. The educational landscape has changed and therefore, fifty years later, it is easy for educational researchers to see the error in the assumptions made by Stanley and Bolton. However, there are still a few educators who continue to offer their criticisms of Bloom's taxonomy. Robert Marzano (2000) who developed his own taxonomy points out one limitation of Bloom's. Marzano states that the very structure of Bloom's taxonomy is not supported by research. He indicates in his book *Designing a new taxonomy of educational objectives*, that moving from the simplest level of knowledge to the most difficult level of evaluation, does not work with Bloom's pyramid. A hierarchical taxonomy implies that each higher skill is composed of the skills beneath it. This should mean that comprehension should be built upon knowledge, application should require both comprehension and knowledge, and so forth. This, according to Marzano (2000), is not evidenced through the cognitive processes in Bloom's taxonomy. So, educators have trouble classifying challenging learning activities using the taxonomy. Anderson (2001) argues that nearly all complex learning activities require the use of several different cognitive skills. Besides, many theories and approaches to learning have been introduced that make students more knowledgeable of and responsible for their own learning, cognition and thinking. Wineburg and Schneider (2010) remarked that knowledge possessed does not mean knowledge deployed. What this means is that knowledge is a pre-requisite to critical thinking, evaluating and synthesizing and not the reverse. The authors actually question whether Bloom's pyramid is pointed in the right direction. Booker (2007) offers his criticism, pointing out that Bloom's taxonomy was initially meant for higher education but has been misappropriated and distorted when used in the K-12 environment.

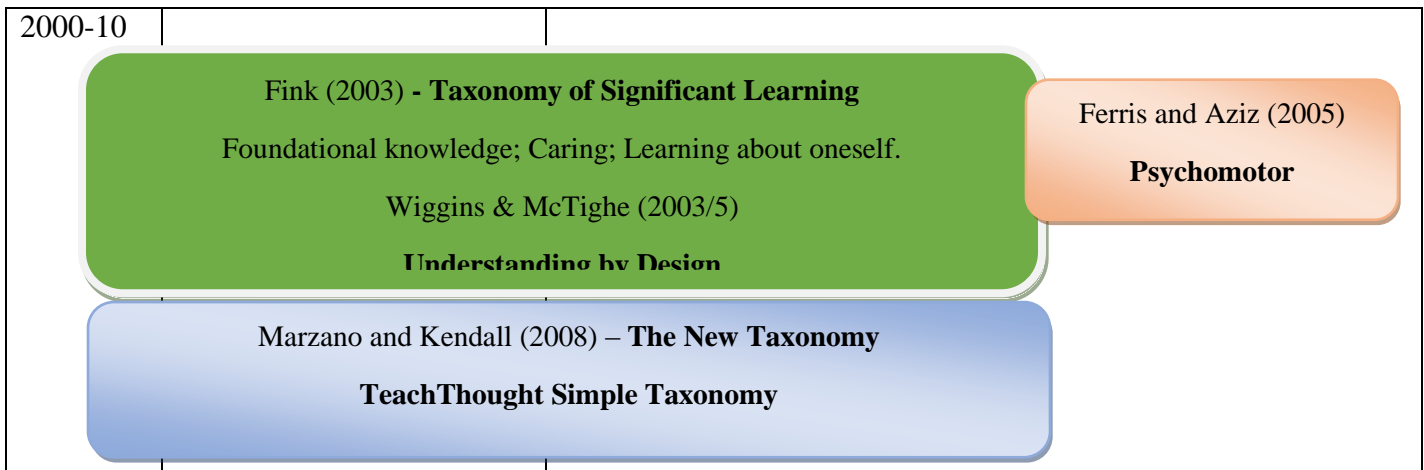
One of the strengths of Bloom's taxonomy is it is relatively easy to understand and widely accepted in the field of education. It can and has been applied to many different learning

environments and situations for a variety of purposes: designing assessments, designing coursework, designing curricula (Forehand, 2005; Kottke & Schuster, 1990). This taxonomy is widely accepted and often referenced in the field of education (Forehand, 2005; Kottke & Schuster, 1990; Kunen et al., 1981). It has been translated and used in many countries (Forehand, 2005), which is a good demonstration of the extent of its use. Due to its wide use and acceptance, this taxonomy provides a common language for the discussion of many topics in education. The greatest strength of the taxonomy is that it has taken the critically important topic of thinking and placed around it a structure that is usable by practitioners. In any classroom, it is evident that those teachers who keep a list of question prompts relating to the various levels of Bloom's Taxonomy undoubtedly do a better job of encouraging higher-order thinking in their students than those who have no such tool, states Anderson (2001).

On the other hand, as anyone who has worked with a group of educators to classify a group of questions and learning activities according to the Taxonomy can attest, there is little consensus about what seemingly self-evident terms like "analysis," or "evaluation" mean (Krathwohl, 1994; Bloom 1994). In addition, so many worthwhile activities, such as authentic problems and projects, cannot be mapped to the taxonomy, and trying to do that would diminish their potential as learning opportunities. In response to the recognized weaknesses of Bloom's taxonomy, Dr. Lorin Anderson, a former student of Bloom, and his colleagues published an updated version. This 1999 update took into account a broader range of factors that have an impact on teaching and learning. This revised taxonomy responds to recent educational and psychological developments. Unlike the 1956 version, the revised taxonomy differentiates between "knowing what," the content of thinking, and "knowing how," the procedures used in solving problems. This goes back to Wineburg and Schneider's (2010) point that knowledge and critical thinking

complement each other. Through constructivism, students should observe, build upon and reconstruct knowledge if they are to make it their own (Wood, 2011). Self-regulated learning is the ability to use and develop knowledge, skills and attitudes acquired in one context in another context (Boekaerts, 1999, p. 446). The revised taxonomy makes provisions for learner-centered paradigms such as constructivism and self-regulated learning in its structure. At all levels of education from schools to universities, emphasis has been placed on the practical application of knowledge. Marzano and Kendall (2008) and Fink (2003) realized that technology has proven that Bloom’s taxonomy was not meant to be the alpha and omega of framing learning, instruction and assessment (O’Neill & Murphy, 2010). There are about six alternatives to Bloom’s version. Table 1 provides an overview of the development of taxonomies and their domains from the mid-1950s and beyond.

Year(s)	Cognitive	Affective	Psychomotor
1950s	<p>Blooms et al. (1956)</p> <p><b>Cognitive</b></p>	<p>Blooms et al. (1956)</p> <p><b>(1964) Affective</b></p> <p>Krathwohl’s et al. (1964)</p> <p><b>Affective</b></p>	<p>Blooms (1956) Dave (1966/72); Harrow (1972)</p> <p><b>Psychomotor</b></p> <p>Dave (1970)</p> <p><b>Psychomotor</b></p>
1960s	<p>Biggs &amp; Collis (1982)</p> <p><b>SOLO Taxonomy</b></p> <p>Novak and Gowin (1984)</p> <p><b>– Vee Diagram</b></p>		
1970s			
1980s			
1990s	<p>Anderson et al. (2001)</p> <p><b>Cognitive with Knowledge</b></p>		



The second table (Anderson et al., 2001, p. 308) shows a comparison of the original and revised taxonomy at the knowledge domain.

The Original Taxonomy	The Revised Taxonomy
<p>A. Knowledge (k)</p> <ul style="list-style-type: none"> <li>i. k. of terminology</li> <li>ii. k. of specific facts</li> </ul> <p>Knowledge of ways and means of dealing with specifics</p> <ul style="list-style-type: none"> <li>i. k. of conventions</li> <li>ii. k. of trends and sequences</li> <li>iii. k. of classification and categories</li> <li>iv. k. of criteria</li> <li>v. k. of methodology</li> </ul> <p>Knowledge of universals and abstractions in a field</p> <ul style="list-style-type: none"> <li>i. k. of principles and generalizations</li> <li>ii. k. of theories and structures</li> </ul>	<p>A. Factual knowledge: The basic elements that students must know to be acquainted with a discipline or solve problems in it.</p> <ul style="list-style-type: none"> <li>Aa. Knowledge of terminology</li> <li>Ab. Knowledge of specific details and elements</li> </ul> <p>B. Conceptual knowledge: the interrelationships among the basic elements within a larger structure that enable them to function together.</p> <ul style="list-style-type: none"> <li>Ba. Knowledge of classification and categories</li> <li>Bb. Knowledge of principles and generalizations</li> <li>Bc. Knowledge of theories, models, and structures</li> </ul> <p>C. Procedural knowledge: How to do something; methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.</p> <ul style="list-style-type: none"> <li>Ca. Knowledge of subject-specific skills and algorithms</li> <li>Cb. Knowledge of subject-specific techniques and methods</li> <li>Cc. Knowledge of criteria for determining when to use appropriate procedures.</li> </ul> <p>D. Metacognitive Knowledge: Knowledge of cognition in general as well as awareness and knowledge of one's own cognition.</p> <ul style="list-style-type: none"> <li>Da. Strategic Knowledge</li> <li>Db. Knowledge about cognitive tasks, including appropriate contextual and conditional knowledge.</li> <li>Dc. Self-knowledge</li> </ul>

Lastly, Krathwohl (2010) who worked along with Lorin Anderson reminds teachers that the original taxonomy was best seen as a heuristic for studying, understanding and solving educational problems. He offered his own suggestions as to how the taxonomy might be revised and updated. Unlike the original, one-dimensional taxonomy, he suggested revisions that could contain two dimensions: knowledge and cognitive processes. The implications of this change for education should involve teachers thoughtfully reflecting upon the revised taxonomy and using it to judge the effectiveness of their teaching in terms of what students actually learn (Byrd (2002). Even though some would argue that the taxonomy has been abused and misused and is perhaps damaging to student's thinking, then, why has it maintained its enduring popularity in public education and curriculum for decades. It may be because it is was meant to be a guide for teachers and that it should be used for that purpose.

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