"Bloom's Taxonomy, a Closer Look"

In the fields of biology, botany and engineering, the term taxonomy has been used when outlining specific terminology, the identification of the technical elements, and the classification of claims exclusive to those particular fields (Barak, 2013; Dayrat, 2005; Ensminger, 2014). In 1948, at the American Psychological Association convention in Boston, a group of educational professionals assembled under the guidance of Dr. Benjamin Bloom to discuss the possibility of devising a taxonomy system specific to the field of higher education. The system would seek to formalize communication across colleges and universities in an attempt to define educational objectives and behaviors in assessment practices at the college level (Bloom, Engelhart, Furst, Hill & Krathwohl, 1956). Since 1956, the classification system developed by Bloom et al., Bloom's Taxonomy, has significantly influenced the advancement of instruction and scholarship utilizing a uniform assessment language at every level of education (Adams, 2015).

Within the forward of *Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook 1: Cognitive Domain* (Bloom et al., 1956), the committee alludes to its purpose as providing the development of a classification of educational aims defined in behavioral scientific terms. The authoring committee addressed three domains of learning: cognitive, affective, and psychomotor (Bloom et al., 1956), beginning with cognitive-domain. According to Krathwohl (2002), the "Handbook" was originally designed for the college level. Bloom's group cautiously approached the development of the cognitive-domain handbook by sharing early versions with colleagues for critiques prior to publication (Bloom et al., 1956). After the early review process, the possibility of using it as a guide for curriculum building took on a larger role (Sosniak, 1994).

Within its introduction, Bloom et al (1956) viewed one aim of the taxonomy as providing a means to examine the goals of our educational system for those in education. Applications of the taxonomy have been utilized in the development of goals relating to cognition (Barak, 2013), as a means to assess current curriculum when identifying needed additions in curriculum development (Hayter, 1983), and to provide perspective on the importance assigned some behaviors by selected educational goals (Nayef, Yaacob, & Ismil, 2013). Seaman (2011) tributes that the switch in Bloom's Taxonomy's focus from assessment to a real-world concern for curricula could have amplified the usefulness of the taxonomy, thereby making it available to a larger audience.

The taxonomy, which delineates a six category hierarchy framework, with knowledge being the base, and comprehension, application, analysis, synthesis, and evaluation stacking from simple to complex, suggests, as related by Bloom et al (1956), "if we view educational objectives as intended behaviors which the student shall display …we intend the learning experiences to change the student's behavior from a simpler type to another more complex one which in some ways include the first type" (p.16). Hayter (1983) applied Bloom's Taxonomy as a means for students to reflect on the use of objective constructed assessment measures in nursing education. Anderson (2002) identifies the use of the taxonomy table to support the alignment of curriculum and the need for accountability on behalf of schools.

Those in agreement with Bloom's taxonomy also point to research supporting the need for students to be active learners who are instructed utilizing techniques that require higher order thinking skills (Weigel & Bonica, 2014). Addressing the use of the taxonomy with the development of K-12 engineering courses, Barak (2012) gives a nod to its ability to encourage higher order thinking through the application of instruction designed to encompass the levels

from knowledge to analysis. Weigel and Bonica (2014) completed a study centered around the use of Bloom's Taxonomy to support active learning and gaming to encourage student engagement and knowledge retention.

In revising Bloom's Taxonomy, Anderson et al., (2001) relate the need to bring attention to the visionary aspects of the original version as well as the inclusion of new knowledge and ideas into its framework. The authors utilized active verbs to label the six categories in the cognitive-domain and the four in the knowledge dimension: remember, understand, apply, analyze, evaluate and create and factual, conceptual, procedural, and metacognitive (Anderson et al., 2001). This revised version of Bloom's taxonomy was designed to provide a means to better understand outcomes based educational objectives through helping teachers answer the learning, instruction, assessment and alignment questions (Huitt, 2011).

Fifty years after its initial entrance into the academic arena, the success of Bloom et al intentions continue to be debated (Booker, 2008; Gardner, 1993; Iran-Nejad & Steward, 2010). In contradiction to Bloom, Gardner (1993) rejects his stand on the importance of training to impact ability. As a refute, Gardner (1993) recommends the use of his multiple intelligence theory, which accepts "a pluralistic view of mind, recognizing that people have different cognitive strengths and contrasting cognitive styles" (p. 6). The failure of Bloom's Taxonomy to address the importance of understanding in the learning process was questioned by Iran-Nejad and Stewart (2010).

While the placement of knowledge at the base of the taxonomy pyramid was found counterproductive for history students by Wineburg and Schneider (2009), the authors see knowledge as it relates to the field of history being the goal students work to acquire.

Booker (2008) arguing against the displacement of knowledge in the taxonomy. Looks to the educational community's belief in Bloom's Taxonomy as a contributing factor in the decline in the United States educational system faulting the shift to problem based learning strategies that call for critical thinking skills at the loss of time spent on knowledge acquisition (Booker, 2008). This rejection focused more on Booker's belief of the incorrect adoption of the theoretical framework by constructivists whom he deliberated, misused the taxonomy to support their own belief system (Booker, 2008).

Bloom's taxonomy, with its multiple revisions and distractors, continues to be instrumental in education (Seaman, 2011). Researchers attempting to define the how and what in relation to curriculum and assessment development may look to Bloom for guidance. How the use of Bloom's taxonomy will develop in 21century education setting has yet to be proven for its long term benefits

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