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A Critical Appraisal of Bloom's Taxonomy

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Abstract: This investigation intends to criticize Bloom's original and revised taxonomies which has been utilized since 1956 and was revised in 2001, respectively. First, this study goes through the description of the original and the revised taxonomies. Second, it starts explaining the major criticisms on Bloom's original taxonomy. Third, it also explicates a number of criticisms on the revised taxonomy. Moreover, the article wraps up the criticisms with several ancillary criticisms, in general. Furthermore, the study summarizes all the major criticisms in the form of a figure. Finally, some implications are proposed for those who tend to apply Bloom's taxonomy in their investigations.

Keywords: Bloom, Taxonomy, Revised Taxonomy, Original Taxonomy, Criticism, Critical Evaluation.

1. Introduction

Bloom's taxonomy is a skeleton that was constructed to categorize the goals of any curriculum in terms of explicit and implicit cognitive skills and abilities. This taxonomy is regarded as one of the crucial models that contribute to the curriculum development in the 21st century. In this vein, a search engine presents more than 817,000 results for the keyword "Bloom's taxonomy." Bloom's taxonomy perseveres in and survives against the time. It has been expanded, elaborated, and interpreted in various ways and its breadth has been expounded on. As a result of searches and studies on original taxonomy, many comments and implementations which are different in certain ways are presented form drafting work to broadened instructions. Despite the varieties, only one revision is accepted (Forehand, 2005).

This revision was designed by an old student of Bloom, Lorin W. Andreson and David R. Krathwohl (2003), who is one of the designers of the original taxonomy.

In 1999, Dr. Lorin Anderson, a former student of Bloom's, and his colleagues published an updated version of Bloom's Taxonomy that takes into account a broader range of factors that have an impact on teaching and learning. This revised taxonomy attempts to correct some of the problems with the original taxonomy. Unlike the 1956 version, the revised taxonomy differentiates between "knowing what," the content of thinking, and "knowing how," the procedures used in solving problems. The Knowledge Dimension is the "knowing what." It has four categories: factual, conceptual, procedural, and metacognitive. Factual knowledge includes isolated bits of information, such as vocabulary definitions and knowledge about specific details. Conceptual knowledge consists of systems of information, such as classifications and categories. Procedural knowledge includes algorithms, heuristics or rules of thumb, techniques, and methods as well as knowledge about when to use these procedures. Metacognitive knowledge refers to knowledge of thinking processes and information about how to manipulate these processes effectively. The Cognitive Process Dimension of the revised Bloom's Taxonomy like the original version has six skills.

They are, from simplest to most complex: remember, understand, apply, analyze, evaluate, and create. Remembering consists of recognizing and recalling relevant information from long-term memory. Understanding is the ability to make your own meaning from educational material such as reading and teacher explanations. The sub-skills for this process include interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining. The third process, applying, refers to using a learned procedure either in a familiar or new situation. The next process is analysis, which consists of breaking knowledge down into its parts and thinking about how the parts relate to its overall structure. Students analyze by differentiating, organizing, and attributing. Evaluation, which is at the top of the original taxonomy, is the fifth of the six processes in the revised version. It includes checking and critiquing. Creating, a process not included in the earlier taxonomy, is the highest component of the new version. This skill involves putting things together to make something new. To accomplish creating tasks, learners generate, plan, and produce. According to this taxonomy, each level of knowledge can correspond to each level of cognitive process, so a student can remember factual or procedural knowledge, understand conceptual or metacognitive knowledge, or analyze metacognitive or factual knowledge. According to Anderson and his colleagues, "Meaningful learning provides students with the knowledge and cognitive processes they need for successful problem solving". The following figure compares Bloom's original taxonomy (1956) with the revised version (2001).

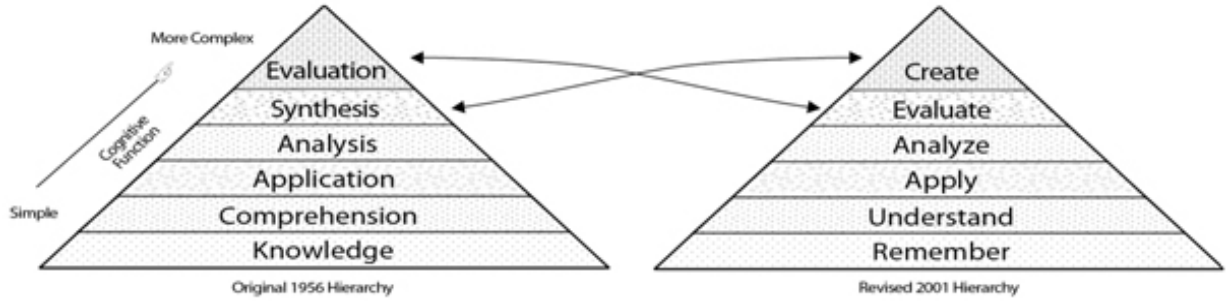

Fig1. *Comparison of Bloom's original and revised taxonomies*

2. Criticisms

Today's world is a different place, however, than the one Bloom's Taxonomy reflected in 1956. Educators have learned a great deal more about how students learn and teachers teach and now recognize that teaching and learning encompasses more than just thinking. It also involves the feelings and beliefs of students and teachers as well as the social and cultural environment of the classroom. Several cognitive psychologists have worked to make the basic concept of a taxonomy of thinking skills more relevant and accurate. In developing his own taxonomy of educational objectives, Marzano (2000) points out one criticism of Bloom's Taxonomy. The very structure of the Taxonomy, moving from the simplest level of knowledge to the most difficult level of evaluation, is not supported by research. A hierarchical taxonomy implies that each higher skill is composed of the skills beneath it; comprehension requires knowledge; application requires comprehension and knowledge, and so on. This, according to Marzano (2000), is simply not true of the cognitive processes in Bloom's Taxonomy. The originators of the original six thinking processes assumed that complex projects could be labeled as requiring one of the processes more than the others. A task was primarily an "analysis" or an "evaluation" task. This has been proven not to be true which may account for the difficulty that educators have classifying challenging learning activities using the Taxonomy.

Anderson (2000) argues that nearly all complex learning activities require the use of several different cognitive skills. Like any theoretical model, Bloom's Taxonomy has its strengths and weaknesses. Its greatest strength

is that it has taken the very important topic of thinking and placed a structure around it that is usable by practitioners. 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. 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. 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 the following sections, this study presents several in-depth criticisms.

2.1. Criticisms on Bloom's Original Taxonomy

2.1.1. Anachronism

Quite a few new theories and approaches have been involved in the literature as a result of researches carried out in educational and psychological terms since the date when Bloom's taxonomy was published. Theory and approaches such as constructivism, metacognitive skills and self-regulated learning affect the educational process, support autonomous learning and cognitive and perceptual necessity of being responsible of the learning process. These theories and approaches clear up the necessity of the taxonomy revision (Amer, 2006). Today's world is different from Bloom's taxonomy that reflects features of 1956. In this day and time educators have more knowledge about how learning takes place and how teachers lecture (Startalk, 2009). In this case, the shortcoming of the taxonomy and the need for an appropriate structure to become a learner-centered becomes conspicuous.

2.1.2. Agglomeration

Bloom's taxonomy has an additive sort of structure. It steps forward based on the degree of difficulty, and according to the need to activate a former one for the next step. There is chiseled ranking of sections. The taxonomy presents its cognitive process in categories. They are different from each other just in terms of difficulty. However, the rigid hierarchy between categories was later softened up and overlapping between categories was provided (Krathwohl, 2002).

2.1.3. Lack of Constructivist Integration

Constructivism emphasizes how students create knowledge while they are busy with meaningful learning. Constructing process requires both comparing new information with old ones and using necessary various cognitive processes for this information. In this taxonomy, students may not be able to participate in an active way in learning process. Students might not be able to select the information themselves and form their own meaning on their own. In this taxonomy, it is essential for some students to reach up the top level. Today, it is expected that every student should make progress on an integrative basis. For this reason, combining program objectives, teaching, and assessment is more crucial than ever merged (Pickard, 2007).

2.1.4. Unilateral Levels

Knowledge level consists of both noun and verb forms in the taxonomy. Whereas target dimension described as noun form is situated in the wide frame bottom steps of knowledge step, verb forms describing cognitional process is defined as students' recognizing and remembering the knowledge. As a consequence of that knowledge step expected to have two dimensional characteristics becomes unilateral. Unilateral structure of the taxonomy fails within the scope of cognitional process. In the knowledge-sized taxonomy students are asked for both knowing the knowledge and remembering it. Although this abnormality has been changed in the revised taxonomy, again this latter one is unidirectional since it takes into account the verb aspect of cognitional process (Krathwohl, 2002).

2.1.5. Atheoretical Levels

Bloom's taxonomy is almost 50 years old. It was developed before we understood the cognitive processes involved in learning and performance. The categories or "levels" of Bloom's taxonomy (knowledge, comprehension, application, analysis, synthesis, and evaluation) are not supported by any research on learning. The only distinction that is supported by research is the distinction between declarative/conceptual knowledge (which enables recall, comprehension, or understanding) and procedural knowledge (which enables application or task performance).

2.1.6. Inconsistent Application

The consistent application of Bloom's taxonomy across multiple designers/developers is impossible. Given any learning objective, it might be classified into either of the two lowest levels (knowledge or comprehension) or into any of the four highest levels (application, analysis, synthesis, or evaluation) by different designers. Equally, there is no consistency in what constitutes instruction or assessment that targets separate levels. A more reliable approach is to separate objectives and practice/assessment items into those that elicit or measure declarative/conceptual knowledge from those that elicit or measure task performance/procedural knowledge.

2.2. Criticisms on Bloom's Revised Taxonomy

2.2.1. Ineffectual Rectifications

First of all, the revision involves several seemingly trivial, though conceptually fairly significant changes. Generally, Bloom's Revised Taxonomy has not brought a radical change onto Bloom's original classification, though has provided some significant innovations. The subcategories of all levels in the original table have been made just wider and more comprehensible in the revised one. The Revised taxonomy enables it only to utilize qualitative data collection tools or recent approaches such as performance-based and authentic evaluation. Recently, it is believed that the revised taxonomy makes up the deficiencies of the Original Taxonomy, and aims to reflect the accumulation of recent knowledge and implementations in the field of educational science. However, with this new arrangement, classification of cognitive domain may not be functional and traceable in practice.

2.2.2. Cumulative Succession

Although the Revised Taxonomy supplies the educators with a meaningful systematic classification for thinking and learning processes, the six levels in this structurally cumulative and hierarchical system constitute a succession, not an authentic integration seen in real-life situations. Moreover, in the process of teaching and learning, teachers need to evaluate students' skills integratively. In order for this integrative evaluation to be carried out, the level of intellectual behavior is required to be integratively proposed, not in the form of a cumulative succession which may be far from reality. In other words, in the real-life situations, such succession might not exist and these domains of cognitions might not be logical to be called levels since the functionality of these domains are not actually successive, but integrative and usually simultaneous.

2.2.3. Pedagogical Impracticality

The distinctions in Bloom's taxonomy make no practical difference in diagnosing and treating learning and performance gaps. Everything above the "knowledge" level is usually treated as "higher-order thinking" anyway, effectively reducing the taxonomy to two levels. In the same vein, the Revised Taxonomy does not provide an assessment tool for an integrative thinking skill. Furthermore, today's teachers have difficulty in deciding upon how to spend the classroom time in a dynamic and integrative way. From this aspect, it is an essential requirement to integrate educational goals with local, regional and national standards simultaneously. The Revised Taxonomy does not have such coherence of purpose, goal, "essential question," and target with each lesson plan in an integrative way. Containing 19 subcategories and two dimensions, the revised taxonomy

constitutes a complex and long structure for teachers. In other words, although it provides teachers with a powerful tool to develop better lesson plans (Forehand, 2005), it is so complicated for them to put it into practice.

2.2.4. Equivocal Weightings

Bloom's taxonomy was revised in order to be adjusted to suit the more outcome-focused modern education objectives. The level of synthesis is placed at one step higher than the level of evaluation. However, levels of evaluation and synthesis are both significant, and none of them is superior to the other. Both of them are the equal from the aspect of complexity. Once either of them is omitted in the process of problem solving, the efficiency of the process declines. Moreover, terminological insight was ignored. In this vein, content sufficiency must be questioned. Also, it seems problematic that knowledge is placed into the same process with skills and abilities, especially into the lowest level of the process.

2.3. Some Ancillary Criticisms on Bloom's Taxonomy

2.3.1. Discordant Application

Benjamin Bloom (1956) proposed the taxonomy of Educational Objectives, i.e. Cognitive Domain, and the six-level explication of thinking which has been broadly harmonized and applied in innumerable contexts so far. His tabulation of cognitive processes is constituted from the most facile, the recall of knowledge, to the most complicated, making judgments about the value and worth of an idea. With regard to the Revised Bloom Taxonomy, alterations are observed in three main territories. These include: Terminology, Structure, and Emphasis (Forehand, 2005; Krathwohl, & Anderson, 2003). Bloom's Taxonomy is broadly cited in many teacher training programs in reference to how students learn and how to teach. However, it has been maintained that Bloom's Taxonomy is more often than not interpreted incorrectly. Booker (2007) believes that "Bloom's Taxonomy has been used to devalue basic skills education and has promoted "higher order thinking" at its expense" (2007, p.248). In other words, lower order skills such as knowledge and comprehension are being considered as less critical or invaluable skills. Being referred to as lower order skills does not make knowledge or comprehension any less important, rather they are arguably the most important cognitive skills because knowledge of and comprehension of a subject is vital in advancing up the levels of the taxonomy. Therefore, in line with Booker's conclusion, the Taxonomy is being improperly used. Bloom never stated that any of his cognitive levels were less important, just that they followed a hierarchical structure. Booker (2007) points out that even Bloom himself recognized that the application of the taxonomy was unexpectedly happening at the K-12 level and much less so at the university/college level. Ultimately, the criticism lies with the intention behind the application of Bloom's Taxonomy and not with Bloom himself.

2.3.2. Indefiniteness of the Taxonomies

The original taxonomy has been widely acclaimed and commonly used in our country as in the whole world, and it will obviously be in use for a long time. However, as for everything related to human being, a revision for the taxonomy has become inevitable with the proceeds of the new millennium. In this regard, Anderson and Krathworlh (2001) must be acclaimed and thanked for their studies. However, it must be taken into account that also the revised taxonomy might not be a reliable source since it is required to be made more comprehensible at higher levels and to be interiorized by the educators, and also, related samples of various disciplines are required to be built up in the literature in order to enable school teachers to utilize the revised version. From this aspect, curriculum developers must be informed to be more careful in the implementation of this revised one.

2.3.3. Misinterpretations of the Contents

Bloom's Taxonomy is often misinterpreted and misapplied by educators. Repeatedly, it is observed that educators interpret the lower levels of thinking to be appropriate for introductory and survey level college courses and that the higher order thinking skills are appropriate for advanced, or junior, senior, and graduate level courses.

The impact of that is that early college learners in those courses are limited to only rote knowledge experiences. Of course, that is a problem with the implementation of Bloom's theory and not the theory itself. However, it is still crucial given the impact that Bloom's has on the learning experience, and it leads into a related argument.

2.3.4. Contempt for Proficiency Level

Bloom's Taxonomy – at least in its popular repetitions – fails to acknowledge that learners may perform at varying levels of proficiency within each type of higher order thinking skill. It's not that an early college learner is incapable of application, analysis, synthesis and evaluation; they simply will not perform with an expert level of proficiency in those higher order thinking skills; they should be expected to apply, analyze, synthesize, evaluate, or create, but they will do that at a novice level. For example, a student in a first year micro-biology class can and should be expected to apply knowledge of cell structures and epidemiology to identify a particular organism; however, the level of difficulty of the problem should be appropriate for the first year micro-biology student and not require advanced declarative or procedural knowledge which typically requires advanced study in micro-biology.

2.3.5. Unauthentic Abstract Nature

Technology makes possible many more avenues for students to perform and to be assessed; the range of simulations and interaction that can be created through technology enables more authentic problem solving opportunities. Plus, the increasing demands in academia and the workplace for learners to be better prepared suggest learners need more authentic learning experiences. The combination of those to facts indicates learners need to be performing to apply knowledge in as close to "real life" situations as possible. This supports Startalk's (2009) argument that "all objectives are at the use level (that is, "performance" objectives) and that learners will practice or be assessed on the particular performance in representative task situations." We should be observing students performing as they will need to in the future – and measure that performance, at whatever level of expertise is appropriately and reasonably expected of that learner given their prior learning experiences. Simply "knowing" or "comprehending" something is not enough. Perhaps classroom assessment would benefit from focusing on simply engaging learners with active, collaborative and authentic learning experiences and measuring their performance according to the level of expertise the learners should exhibit in that environment.

2.3.6. Oversimplification of Thought

As influential as Bloom's Taxonomy has been on educational practice, it has experienced some severe criticisms (for a review, see Kreitzer & Madaus, 1994). One of the most common criticisms was that the taxonomy oversimplified the nature of thought and its relationship to learning (Furst, 1994). The taxonomy certainly expanded the conception of learning from a simple, unidimensional, behaviorist model to one that was multidimensional and more constructivist in nature. However, it assumed a rather simple construct of difficulty as the characteristic separating one level from another: Superordinate levels involved more difficult cognitive processes than did subordinate levels. The research conducted on Bloom's Taxonomy simply did not support this structure. For example, educators who were trained in the structure of Bloom's Taxonomy were consistently unable to recognize questions at higher levels as more difficult than questions at lower levels of the taxonomy (see Fairbrother, 1975; Poole, 1972; Stanley & Bolton, 1957).

2.3.7. Incompatible Hierarchy

Some problems with Bloom's Taxonomy were indirectly acknowledged by its authors. This is evidenced in their discussion of analysis: "It is probably more defensible educationally to consider analysis as an aid to fuller comprehension (a lower class level) or as a prelude to an evaluation of the material" (p. 144). The authors also acknowledged problems with the taxonomy's structure in their discussion of evaluation. They state that although evaluation is placed last in the cognitive domain because it is regarded as requiring to some extent all the other

categories of behavior, it is not necessarily the last step in thinking or problem solving. It is quite possible that the evaluation process will in some cases be the prelude to the acquisition of new knowledge, a new attempt at comprehension or application, or a new analysis and synthesis. Therefore, in general, the hierarchical structure of Bloom's Taxonomy simply did not hold together well from logical or empirical perspectives. As Rohwer and Sloane (1994) note, the structure claimed for the hierarchy, then, resembles a hierarchy (p. 47). The following figure summarizes all the critical issues mentioned above.

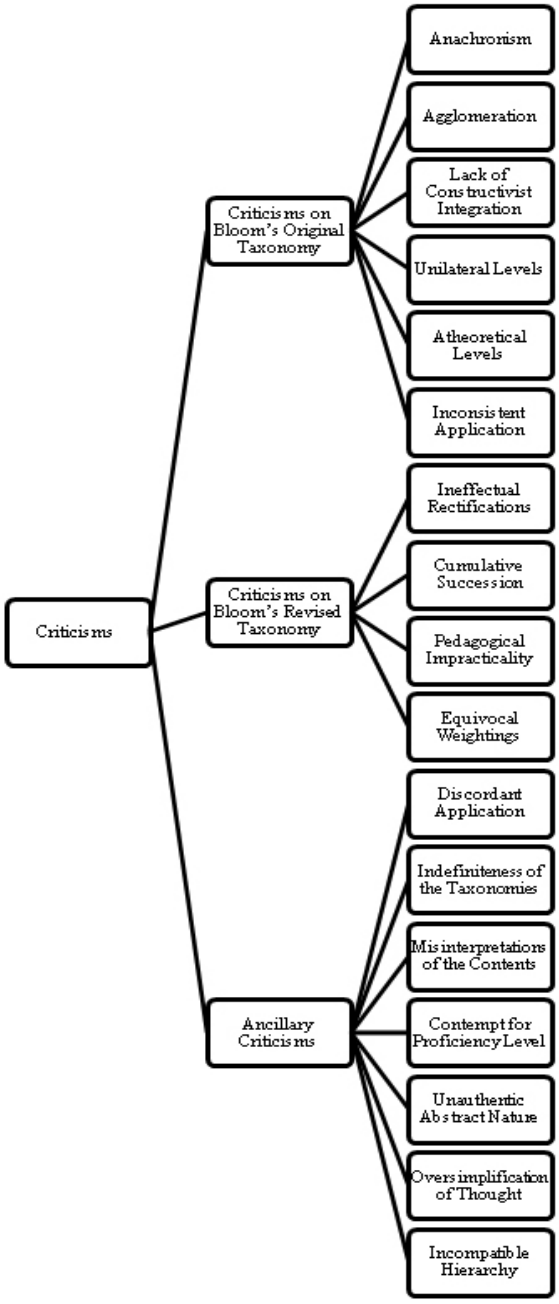

Fig2. *Summarized Criticisms on Bloom's Taxonomy*

3. Conclusion and Implications

This investigation was an attempt to criticize Bloom's original and revised taxonomies which has been utilized since 1956 and was revised in 2001, respectively. First, this study went through the description of the original and the revised taxonomies. Second, it explained the major criticisms on Bloom's original taxonomy. Third, it also explicated a number of criticisms on the revised taxonomy. Moreover, the article wrapped up the criticisms with several ancillary criticisms, in general. Finally, the study summarizes all of these crucial criticisms in the form of Figure 2. Recent taxonomies of objectives and learning object strategies distinguish among types of content (usually facts, concepts, principles, procedures, and processes) as well as levels of performance (usually remember and use). This content-by-performance approach leads to general prescriptions for informational content and practice/assessment. However, a more radical approach would be to have no taxonomy at all, to simply assume that all objectives are at the use level (that is, "performance" objectives) and that learners will practice or be assessed on the particular performance in representative task situations. If there are "enabling" sub-objectives, those too can be treated as performance objectives without further classification. If, for example, a loan officer needs to be able to distinguish among types of mortgages and describe the pros and cons of each type of mortgage as an enabling skill for matching house buyers with mortgages, then we design/provide opportunities to practice categorizing mortgages and listing their pros and cons before we practice on matching buyers to mortgages. If a car salesperson needs to be able to describe the features of different car models as an enabling skill for selling cars, then we design/provide opportunities to practice describing the features of different cars before we practice on selling cars.

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