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The New Taxonomy of Educational Objectives

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Contents

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CHAPTER ONE

The Need for a Revision of Bloom's Taxonomy

In 1956, a small, somewhat technical volume was published under the title, *Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain* (Bloom et al., 1956). In the 50-plus years since its publication, "Bloom's Taxonomy," as it is frequently referred to in deference to Benjamin Bloom, the work's editor, has been used by educators in virtually every subject area at virtually every grade level. The expressed purpose of the taxonomy was to develop a codification system whereby educators could design learning objectives that have a hierarchical organization.

> You are reading about an attempt to build a taxonomy of educational objectives. It is intended to provide for classification of the goals of our educational system. It is expected to be of general help to all teachers, administrators, professional specialists, and research workers who deal with curricular and evaluation problems. (p. 1)

That Bloom's Taxonomy is still used after some 50 years is a testament to its contribution to education and psychology. Indeed, the 93rd yearbook of the National Society for the Study of Education (NSSE), titled *Bloom's Taxonomy: A Forty-Year Retrospective,* documents the impact of the work:

> Arguably, one of the most influential educational monographs of the past half century is the *Taxonomy of Educational Objectives, The Classification of Educational Goals, Handbook I: Cognitive Domain.* Nearly forty years after its publication in 1956 the volume remains a standard reference for discussions of testing and evaluation, curriculum development, and teaching and teacher education. A search of the most recent *Social*

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> *Science Citation Index* (1992) revealed more than 150 citations to the *Handbook.* At a recent meeting of approximately 200 administrators and teachers, the senior editor of this volume asked for a show of hands in response to the question, "How many of you have heard of Bloom's Taxonomy?" Virtually every hand in the audience was raised. Few education publications have enjoyed such overwhelming recognition for so long. (Anderson & Sosniak, 1994, p. vii)

Those interested in a thorough discussion of the many uses and analyses of Bloom's Taxonomy should consult the 1994 NSSE yearbook. However, a brief synopsis is useful here.

A Brief History of the Use of Bloom's Taxonomy

A scrutiny of the past 50-plus years in education indicates that Bloom's Taxonomy has had a significant, albeit uneven, influence on educational theory and practice. According to Peter Airasian (1994), the taxonomy fitted nicely into the instructional objectives movement that attained national prominence after the publication of Robert Mager's (1962) *Preparing Instructional Objectives*. Mager's book was explicitly designed to help those intending to develop a methodology of programmed instruction and was based on the premise that cognitive tasks could be ordered hierarchically. Airasian (1994) notes that "one might think, given this affinity, that the taxonomy would have been an influential tool in the development of programmed instructional sequences. In one sense it was" (p. 87). As Edgar Dale (1967) explains, Bloom's Taxonomy became the structure around which many initial efforts at programmed instruction were organized. However, Airasian (1994) argues that Bloom's Taxonomy was ultimately replaced by Gagne's (1977) framework as the conceptual organizer for programmed instruction. Although Gagne's framework was less hierarchical than Bloom's Taxonomy, it was more easily translated into instructional practice.

Whereas Bloom's Taxonomy had a minimal influence on curriculum, it had a strong effect on evaluation. By 1970, Ralph Tyler's model of evaluation design was fairly well established. Specifically, Tyler presented an objectives-based view of evaluation in which a program or an instructional intervention was evaluated on the extent to which it had accomplished its explicit goals (for a discussion of Tyler's model, see Madaus & Stufflebeam, 1989). The more precisely goals were stated, the more precisely a program could be evaluated. Bloom's Taxonomy proved to be a powerful tool for objectives-based evaluation in that it allowed for a level of detail in stating goals that had not previously been readily attained.

Bloom's Taxonomy also proved to be a valuable tool for those who ascribed to the model of evaluation known as the "planning, programming,

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budgeting system" (PPBS). Initially used in the Pentagon, PPBS followed Tyler's tenets of objectives-based evaluation in that it was predicated on first identifying the intended outcomes of a program, then measuring the extent to which these outcomes had been achieved at the program's conclusion. This system became popular in education when it was adopted as the primary tool for evaluating the effectiveness of the 1965 Elementary and Secondary Education Act (ESEA), which was a direct consequence of President Lyndon Johnson's War on Poverty. Under ESEA, Title I funds were allocated to provide additional educational services to lower-achieving students in schools having large proportions of children from low-income backgrounds. Airasian (1994) explains that "for the first time in history substantial amounts of federal aid, more than a billion dollars a year at its inception, were funneled into local school districts to meet the educational needs of disadvantaged children" (p. 89). Given the scale of the financial aid available to schools under Title I, some politicians demanded reporting requirements that would ensure the monies were being used appropriately. Eventually, PPBS became the preferred Title I assessment vehicle and Bloom's Taxonomy the preferred system for articulating program objectives.

The 1970s also marked the beginning of statewide testing. Indeed, in 1960 only one state had a mandated statewide test; by 1985, 32 states had mandated tests. Virtually every state test was designed to provide information about student achievement on specific topics within specific subject areas, and virtually every state test made use of Bloom's Taxonomy, at least to some extent, to define various levels of skill. By the mid-1970s, state tests began to take a minimum-competency approach. As Airasian (1987) explained, minimum-competency tests were different from the more general forms of tests in at least three ways: (1) They were mandated for all schools and virtually all students within a state in which their predecessors could be administered to representative samples of students; (2) the mandate took away much, if not all, of individual districts' discretion in terms of test selection, administration, scoring, and interpretation; and (3) the tests had built-in sanctions if specific levels of performance were not met. Again, Bloom's Taxonomy was widely used as the model for designing items that measure low-level or basic skills versus so-called higher-level skills.

The 1980s saw the beginning of an emphasis on teaching higher levels of thinking. It was this movement, along with research on the validity of Bloom's Taxonomy (reviewed in a subsequent section), that raised awareness as to the need to revise it. A barrage of books, articles, and reports appeared, supporting the need for instruction in thinking and reasoning skills. For example, such prominent organizations as the Education Commission of the States (1982) and the College Entrance Examination Board (1983) highlighted the need to teach thinking. High-impact reports, such as *A Nation at Risk* (National Commission, 1983), pointed to deficiencies in higher-level thinking as a major

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weakness in American education. Widely read journals, such as *Educational Leadership* and *Review of Educational Research,* devoted entire volumes to the topic (e.g., see Brandt, 1986, and Glasman & Pellegrino, 1984, respectively). Many of these publications cited evidence of students' inability to answer higher-level questions and apply their knowledge.

In May 1984, the Association for Supervision and Curriculum Development (ASCD) called a meeting at the Wingspread Conference Center in Racine, Wisconsin, to consider possible solutions to the problem of students' poor performance on tasks that demand higher-level thinking. One of the suggestions from the conference was that Bloom's Taxonomy should be updated to include current research and theory on the nature of knowledge and the nature of cognition (for a discussion of that conference, see Marzano, Brandt, et al., 1988). As a direct result of that conference, the Association Collaborative for Teaching Thinking was formed. Twenty-eight organizations were official participants in the collaborative, including

American Association of School Administrators

American Association of School Librarians

American Educational Research Association

American Federation of Teachers

Association for Supervision and Curriculum Development

Council of Chief State School Officers

Home Economics Education Association

International Reading Association

Music Educators National Conference

National Alliance of Black School Educators

National Art Education Association

National Association of Elementary School Principals

National Association of Secondary School Principals

National Council for the Social Studies

National Council of Teachers of English

National Council of Teachers of Mathematics

National Education Association

National Middle School Association

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National School Boards Association

National Science Teachers Association

Unfortunately, the collaborative never produced a revision of Bloom's Taxonomy.

Bloom's Taxonomy: A Summary

Given that this work is designed to update Bloom's Taxonomy, it is useful to briefly review it. In its most general form, Bloom's Taxonomy outlines six levels of cognitive processes:

1.00 Knowledge

2.00 Comprehension

3.00 Application

4.00 Analysis

5.00 Synthesis

6.00 Evaluation

Each level is designed to possess defining characteristics.

1.00 Knowledge

The *knowledge* level is operationally defined as information retrieval: "Knowledge as defined here includes those behaviors and test situations which emphasize the remembering, either by recognition or recall, of ideas, materials or phenomena" (Bloom et al., 1956, p. 62). A close examination of this first category shows that Bloom articulates specific types of knowledge, which include the following categories and subcategories:

1.10 Specifics
- 1.11 Terminology
- 1.12 Facts

1.20 Ways and means of dealing with specifics
- 1.21 Conventions
- 1.22 Trends and sequences
- 1.23 Classification and categories
- 1.24 Criteria
- 1.25 Methodology

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1.30 Universals and abstractions
1.31 Principles and generalizations
1.32 Theories and structures

Bloom's category of knowledge, then, mixes the cognitive process of retrieval with the various types of knowledge that are retrieved.

2.00 Comprehension

Comprehension represents the largest class of intellectual skills and abilities. The central feature of the act of comprehension is taking in new information via some form of communication ("when students are confronted with a communication, they are expected to know what is being communicated and to be able to make some use of the materials or ideas contained in it" [p. 89]). The taxonomy does not limit communication to the presentation of information in linguistic (verbal or written) form. Rather, information can be presented symbolically or experientially. Thus a student attempting to understand the ideas underlying a demonstration would be involved in the act of comprehension.

Three forms of comprehension are described in the taxonomy: translation, interpretation, and extrapolation. *Translation* involves encoding incoming information into some form other than that in which it was received. For example, students would be engaged in translation if they summarized in their own words the information contained in a film on the formation of a tornado. Whereas translation involves the identification of the literal structure underlying the incoming information, *interpretation* "may require a reordering of ideas into a new configuration in the mind" (p. 90). Finally, *extrapolation* goes beyond the literal level of comprehension. It involves inferences and predictions based on literal information in the communication and principles and generalizations already possessed by the learner (p. 90).

3.00 Application

The third category of cognitive skills, *application,* is probably the least-well-defined in Bloom's Taxonomy. It is described in relationship to a specific type of knowledge—abstractions—and is defined primarily in terms of how it compares with other levels of the taxonomy. To illustrate, Bloom notes that the comprehension of an abstraction requires students to know the abstraction well enough that they can

> correctly demonstrate its use when specifically asked to do so. "Application," however, requires a step beyond this. Given a problem new to the student, he will apply the appropriate abstraction without having to be prompted as to which abstraction is correct or without having to be shown how to use it in that situation. (p. 120)

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Bloom further explains that an abstraction understood at the level of comprehension can be used only when the conditions for its use are specified. However, the application of an abstraction is demonstrated when one correctly uses the abstraction in a situation in which no mode of solution is specified.

4.00 Analysis

Just as *application* is defined in terms of a subordinate category of Bloom's Taxonomy, *analysis* is defined in terms of application and comprehension. Bloom notes that,

> In *comprehension,* the emphasis is on the grasp of the meaning and intent of the material. In *application* it is on remembering and bringing to bear upon given material the appropriate generalizations or principles. *Analysis* emphasizes the detection of relationships of the parts and of the way they are organized. (p. 144)

Analysis is divided into three subcategories: the identification or classification of (1) elements, (2) relationships among elements, and (3) organizational principles that govern elements (p. 145).

Admittedly, this category overlaps with the categories of comprehension and evaluation: "No entirely clear lines can be drawn between analysis and comprehension at one end or between analysis and evaluation at the other" (p. 144).

5.00 Synthesis

Synthesis primarily involves the generation of new knowledge structures.

> Synthesis is defined here as putting together elements and parts as to form a whole. This is a process of working with elements, parts, etc., and combining them in such a way as to constitute a pattern or structure not clearly there before. Generally, this would involve a recombination of parts of previous experiences with new material, reconstructed into a new and more or less well-integrated whole. (p. 162)

Bloom explains that this category of cognition most clearly calls for creative behavior on the part of the student because it involves newly constructed and oftentimes unique products. Three specific categories of products are defined: (1) unique communications, (2) a plan or set of operations, and (3) a set of abstract relationships.

Again, Bloom acknowledges many similarities between this category and the previous categories: "Comprehension, application, and analysis also

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