The Macrotheme Review

A multidisciplinary journal of global macro trends

Revisiting Bloom's Taxonomy of Educational Objectives

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Abstract

Our study develops a conceptual approach of Bloom's taxonomy of educational objectives as a tool which we argue it has the ability to facilitate the development of the teaching-learning process (including the examination process) as a unitary whole. The 3Ps (Presage-Process-Product) model (Ramsden, 2003) offers a systems approach demonstrating how a learner experiences learning (Duff and McKinstry, 2007:186), grouping elements on three levels: Presage level (where prior educational experience and current learning context influence both the student's learning orientation and the student's perception of the task requirements), SAL level (Students' approaches to learning level which is influenced by the presage level) which determines the Learning outcome. The first objective of the evaluation process resides in improving students' performance, therefore requiring the understanding of students' way of learning. The incentive for considering Bloom's taxonomy is triggered by its role of providing the classification of the goals for the educational systems. We therefore carefully consider the underpinnings of its use within the teaching-learning process including assessing the output of the educational process in terms of students' academic performance. Our conclusions document the taxonomy to be useful as both a teaching-learning tool and a system for monitoring and evaluating students' performance and competences.

Keywords*: Educational objectives, taxonomy, teaching-learning process, performance, competences*

1. Introduction

Our paper focusing on educational objectives is closely linked to the belief that education should be an action that is oriented towards purposes. As Burja et al. (2006) emphasize, the existence of purposes, as well as the necessity of their explicit formulation, arise from education's prospective character, education by nature being necessarily oriented towards the future. Furthermore it is explained how purposes are meant to provide coherence of educational influences taking place in time, dictating the direction of current educational actions, while also foreshadowing the destination of future ones (Burja et al., 2006). Educational objective is one of the terms being used in trade literature with reference to purposes of education. An analysis of literature documents a series of other terms, such as learning objectives, terminal objectives, enabling objectives, performance objectives, aims, outcomes, competences,

instructional objectives or behavioural objectives, that are used with similar meaning, though some differences certainly exist. A simple manner of approaching educational objectives would be to just see them as expressions of what an educator hopes the learner can accomplish as a results of the teaching-learning process.

Furthermore, when designing educational objectives we must consider they should be relevant in terms of confirming the learner's needs and institutional objectives, observable, measurable, logical, unequivocal and feasible when considering the resources that are available. While representing an expression of the purposes of the educational process, educational objectives also serve purposes closely linked to designing the teaching-learning process by facilitating course planning, communicating desirable emphasis of treatment, enhancing curriculum design and facilitating evaluation. Educational objectives are of significant help when considering curriculum planning, analysis and updating, gathering feedback through measurable indicator, as well as informing learners. Designing educational objectives should therefore always be developed by first considering the desired end result.

Educational objectives should be seen as policy statements of direction that provide foundation for the entire educative structure. Regardless of the particular course we might be thinking of, we should always try to first ensure it has an internally consistent structure. In this regard an alignment is necessary between objectives, assessment and instructional strategies. While objectives state what we want the learner to acquire, assessment allows the educator to check to what extant the learner meets the objectives. It is through instructional strategies that the educator provides for the teaching-learning process meant to guide the learner towards the above mentioned objectives. The above mentioned alignment must be consider in the context that makes it possible for each one of the components to change, transforming it into a dynamic process as reflected through the following figure:

Figure 1: Alignment for an internally consistent structure
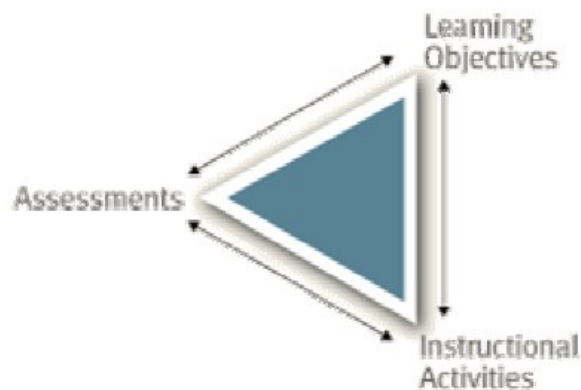
Source: (Carnegie Mellon, 2012[1])

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[1] Figure available at http://www.cmu.edu/teaching/designteach/design/learningobjectives.html, accessed December 21, 2012.

We therefore argue that educational objectives should be considered through their role of supporting the teaching-learning process. Moreover, it is necessary to distinguish objectives from goals. While the latter should be seen as broad statement, general intentions that are rather abstract and more difficult to measure, objectives should be specific, precise, concrete and measurable. If the goal of a learning activity is like a target, the objectives can be defined as the arrows that help the learner reach that target.

2.   Taxonomies: background and evolutions

The development and use of educational objectives is known to have arisen as a way to conceptualize instruction and training programs in the military, but was quickly adopted by educational psychologists and educators (the Academy of Dental Therapeutics and Stomatology[2]). It was in 1956 that Benjamin Bloom and his colleagues published a taxonomy of educational objectives or taxonomy of learner behaviors. The taxonomy influenced curriculum development and enhanced the shift towards competency based instruction. While several changes affected Bloom's original taxonomy that was subsequently revised and updated, nowadays we are witnessing the wide use of educational objectives throughout the life long educational process, including continuing professional education activities. Before developing our framework that argues for the benefits of implementing Bloom's taxonomy within the educational process at university level, we will develop a brief analysis of taxonomies of educational objectives. A first step in this regard requires the clarification of term taxonomy.

A taxonomy of educational objectives comprises the systematized whole of objectives per levels, fields and categories. Burja et al. (2006) point out that different levels and categories of finalities of education do not represent separate entities, but form a structured whole, a systematized ensemble within which each finality has a certain hierarchic positioning and reflects a certain field of the project aimed through education. While there are many manners and criteria to construct taxonomy, practice documents two main types of taxonomies (Burja et al., 2006):

> ➢ Taxonomies that are organized vertically: systemizing the objectives based on their level of generality;
> ➢ Taxonomies that are organized per domain: systemizing the objectives based on the main domains that define a forming profile: cognitive, affective and psychomotor.

Literature provides other types of taxonomies by considering classification criteria such as:

> ➢ Type of objectives: institutional, departmental (intermediate) and specific instructional / behavior;
> ➢ The person: teacher centered and student centered.

Burja et al. (2006) explain how developing a taxonomy of educational objectives finally leads to a hierarchical system of purposes and objectives that requires internal coherence and correct articulation of different levels and steps of passing from general to particular, emphasizing three generally accepted levels in defining educational objectives, as documented

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[2] Information available at http://www.ineedce.com/courses/1561/PDF/ed_goals_objctvs.pdf , accessed December 21, 2012.

through trade literature: the general level of objectives (or general purposes, aims or ideals of education, representing the most general expression of social requests at one moment in time and perspective social aspirations), the intermediary level of objectives (achieving a first translation of the general purposes into particular terms, generally aiming different educational steps and profiles, sides of the educational process and classes) and the actual (concrete) level of objectives (within which objectives are transposed in terms of learner' performances, usually through observable behavior (or whose presence can be recorded in some manner) that can be measured and assessed). A quite similar vertical organization of educational objectives is that presented by Radu (1981 cited by Burja et al. 2006) who discusses the following levels in defining educational objectives: general finalities, purposes, intermediary objectives and operational objectives. De Cecco (1977 cited by Burja et al. 2006) puts forward a different perspective by distinguishing between school objectives, the educator's objectives and the learner's objectives, therefore reflecting the manner in which educational objectives polarize on the social-individual axis.

Moving forward towards taxonomies that are organized per domain, we first have to clarify what each of the three above mentioned domains cover. The cognitive domain deals with intellectual abilities and covers a significant part of the educational objectives, sometimes called *head* objectives. The affective domain relates to expressing feelings, emotions, beliefs, values, fears, interests, attitudes, covering objectives that can often be the most difficult to develop, sometimes called *heart* objectives. The psychomotor domain covers objectives that are generally easy to establish (motor skills) due to behavior being easier to observe and monitor, sometimes called *hand* objectives. All three domains are hierarchical, positioning more complex and higher level skills at the top and fundamentals at the earliest levels, with each level building on itself and assuming mastery at the lower levels. Burja et al. (2006) also underline the fact that specifying objectives per domain represents a necessary step towards developing operational objectives. We will further synthesize the main taxonomies that were developed in literature for the three domains:

Table 1. Taxonomies that are organized per domain

Domain	Taxonomy	Synthesis
Cognitive	B. Bloom	It categorizes a continuum of educational objectives described in terms of learner - centred actions that represent the kind of knowledge and intellectual engagement we want the learner to display. It consists of six levels of objectives, each of which is divided into subcategories. The levels being covered are as follows: knowledge, comprehension, application, analysis, synthesis, evaluation.
	L. d'Hainaut	Defines three levels of hierarchical cognitive operations based on their complexity: particular (specific) operations, simple operations and complete (or combined) operations. It is based on hierarchical cognitive operations, comprising the following cognitive activities presented in the order of their complexity: reproduction, conceptualization, cognitive application, exploration, mobilization, problem solving.
Affective	N. Metfessel	Although Bloom did not focus on the objectives belonging to the affective domain, his taxonomy also comprised such objectives, the most well-known version being that of the affective operational objectives developed by Metfessel, comprising: reception, answer, valuation, organization, characterization.
Psychomotor	A. Harrow	The taxonomy comprises: reflex movements, natural or fundamental movements, perceptive aptitudes, physical aptitudes, motor skills, non-verbal communication.

Source: (authors' projection based on Burja et al. 2006)

For the purpose of our paper we will further detail the presentation in the case of Bloom's taxonomy being initially developed by B. Bloom in 1956 and further revised and updated. One of the well-known updated versions is that by Anderson and Krathwohl (2001). In 1956, a committee of College and University examiners published the Classification of Educational Goals under the name of Taxonomy Educational Objectives: The Classification of Educational Goals. Handbook 1. Cognitive domain, having Benjamin S. Bloom from the University of Chicago as editor. Bloom clearly emphasizes the purpose of such a taxonomy, as follows: *It is expected to be of general help to all teachers, administrators, professional specialists, and research workers who deal with curricular and evaluation problems.* *It is especially intended to help them discuss these problems with greater precision* (Bloom, 1956, p.1 cited by Bonaci et al. 2011). The original taxonomy of educational objectives related to the cognitive domain is structured on two levels: Knowledge and Intellectual abilities and skills (Bonaci et al. 2011). While the first level, Knowledge, *involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting* (Bloom, 1956, p. 201), the second level, Intellectual abilities and skills, refer to *organized modes of operation and generalized techniques for dealing with materials and problems* (Bloom, 1956, p. 201). Knowledge is defined as the remembering of previously learned material, representing the lowest level of learning and involving recalling or reciting: facts, observations, or definitions. Intellectual abilities and skills refers to the mental process of organizing and working with the

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materials and problems in order to achieve a purpose assuming five sub-levels as presented below (Soderholm, 2005[3]):

- ➢ *Comprehension:* defined as the ability to grasp the meaning of material, representing the lowest level of understanding and involving explaining, interpreting, or translating;

- ➢ *Application*: refers to the ability to use learned material in new and concrete situations, requiring higher level of understanding than comprehension and involving applying: rules, methods, laws, principles;

- ➢ *Analysis*: refers to the ability to break down material into its component parts so that its organizational structure may be understood, representing a higher level than previous categories because of requirement of understanding of both the content and structural form of the material and involving analyzing relationships, distinguishing between facts and inferences, evaluating data relevance;

- ➢ *Synthesis*: refers to the ability to put parts together to form a new whole, representing creative behaviours, with emphasis on the formulation of new patterns or structures and involving proposing plans, writing speeches, creating classification schema;

- ➢ *Evaluation*: is concerned with the ability to judge the value of material for a given purpose, representing the highest level because of inclusion of elements of all other categories plus conscious value judgments based on criteria and involving judging logical consistency, adequacy of data support for conclusions.

The taxonomy developed by Anderson and Krathwohl (2001) renounces to use the noun in describing the levels and replaces it with the verb form and also switches the place of the last two levels as synthesized in the following table reflecting the main chances to Bloom's taxonomy:

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[3] Synthesis available at http://web.mit.edu/tll/teaching-materials/learning-objectives/taxonomies.html, accessed December 22, 2012.

Table 2. Bloom 1956 vs. Anderson and Krathwohl 2001[4]

No.	Bloom 1956	Anderson and Krathwohl 2001
1	Knowledge	Remember
2	Comprehension	Understand
3	Application	Apply
4	Analysis	Analyze
5	Synthesis	*Evaluate*
6	*Evaluation*	Create

Source: (authors' projection based on Bloom, 1956 and Anderson and Krathwohl, 2001)

The following section of our paper puts forward a framework for implementing Bloom's taxonomy within the teaching-learning process, drawing from the analysis developed by Bonaci et al. (2011) on the particular case of an accounting class taught within the Faculty of Economics and Business Administration of the Babeş-Bolyai University in Romania.

3. Proposed framework

The starting point of the proposed framework relies on the 1956 committee working on what we nowadays call Bloom taxonomy scope which was to develop a taxonomy of educational objectives that would provide the classification of the goals for the educational systems. We therefore go back to the idea that objectives should represent arrows helping us reach the goal target. Our framework proposes the use of Bloom's taxonomy within the teaching-learning process including assessing the output of the educational process in terms of students' academic performance. A first step in this regard implies courses and seminars to be structured based on the taxonomy. The learner should be asked to read the materials assigned for the classes in advance, while also being assigned with homework involving around three problems or exercises per week. The cope of the seminar would be to check the comprehension of the material assigned to be read and to apply the theory to a specific situation. Courses could be designed to exercise students' abilities to analyze, synthesize and evaluate a given case study. The courses should precede seminars in order to allow the learning process to follow the hierarchy within the taxonomy. Bloom's taxonomy should further be used in developing the examination process aiming to assess the output of the educational process in terms of students' academic performance. The above presented approach considers the university context, but we encourage the taxonomy to be considered throughout the life long educational process, offering alternatives to consider population related particularities as discussed by Smrčka and Arltová (2012).

Defining the educational objectives for a course could be done by using the following table considering the updated versions of Anderson and Krathwohl (2001):

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[4] No. reflects the hierarchical positioning of the levels.

Table 3. Bloom's taxonomy table

The Knowledge Dimension	The Cognitive Process Dimension					
	1. Remember	*2. Understand*	*3. Apply*	*4. Analyze*	*5. Evaluate*	*6. Create*
A. Factual knowledge						
B. Conceptual knowledge						
C. Procedural knowledge						
D. Meta-cognitive knowledge						

Source: (Carnegie Mellon, 2012[5])

An important element of the proposed framework relies on articulating the teaching-learning process by using the taxonomy both throughout the semester and in assessing the output of the educational process in terms of learners' (students') (academic) performance. This would allow for the development of further analyses considering how the grade (as a reflection of students' performance) was formed based on the levels in Bloom's hierarchy. This would provide empirical evidence on students' achievements in relation to the levels considered in the taxonomy. Furthermore, planning could be done by considering the study program (undergraduate, master program, research oriented, professional oriented, long distance etc.) and its objectives.

4.   Concluding remarks

Our paper develops a conceptual approach of Bloom's taxonomy of educational objectives as a tool which we argue it has the ability to facilitate the development of the teaching-learning process (including the examination process) as an articulated unitary whole. The incentive for considering Bloom's taxonomy is triggered by its role of providing the classification of the goals for the educational systems. Our conclusions document the taxonomy to be useful as both a teaching-learning tool and a system for monitoring and evaluating students' performance and competences. The paper discusses the importance of educational objectives, synthesizes existent taxonomies and develops a detailed analysis of Bloom's taxonomy. Key-points to how the taxonomy could be implemented within nowadays' educational environment by considering the entire teaching-learning process are identified. A main limitation of the proposed framework consists in the fact that comparison between students' performance when applying the taxonomy with other approaches is not possible since the same educational context can not be created twice. Still, we encourage the application of the proposed framework by emphasizing the benefits of the analyses that could be developed, as explained in section 3.

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[5]Table available at
http://www.cmu.edu/teaching/resources/Teaching/CourseDesign/TeacherAssessment/taxonomyTable.pdf, accessed December 22, 2012.

Acknowledgement

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